Joint MDB Report to the G8 on the Implementation of the Clean Energy Investment Framework (CEIF) and Their Climate Change Agenda Going Forward

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CONTENTS

Boxes

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AfDB	African Development Bank
APCF	Asia Pacific Carbon Fund
BRT	Bus Rapid Transit
CAI-Asia	Clean Air Initiative for Asian Cities
CARLA	Malawi Climate Adaptation for Rural Livelihoods and Agriculture Project
CCEC	China Clean Energy Capital
CCS	carbon capture and storage
CDM	Clean Development Mechanism
CECAFA	Clean Energy Access and Climate Adaptation Fund for Africa program (AfDB)
CEIF	Clean Energy Investment Framework
CER	Certified Emission Reduction
CF-Assist	Carbon Finance Assist
CHP	combined heat and power
CLIMAP	Climate Change Adaptation Program for the Pacific
ClimDev	Action Plan for Africa on Climate Information for Development Needs
CMI	Carbon Market Initiative (ADB)
COP13	Conference of Parties
CPF	Carbon Partnership Facility
CRMA	climate risk management and adaptation
CTF	Clean Technology Fund
DANIDA	Danish International Development Agency
DMC	Developing Member Country
EBRD	European Bank for Reconstruction and Development
EE	energy efficiency
EEfSD	Energy Efficiency for Sustainable Development (WBG)
EEI	Energy efficiency initiative
EIB	European Investment Bank
ESCO	energy service company
ESMAP	Energy Sector Management Assistance Program
ESW	Economic Sector Work
EU	European Union
FCF	Future Carbon Fund
FCPF	Forest Carbon Partnership Facility
FINESSE	Financing Energy Services for Small-Scale Energy Users (AfDB)
FLEG	Forest Law Enforcement and Governance
FY	fiscal year
G8	Group of Eight: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States
G8+5	Brazil, China, India, Mexico, and South Africa
GDP	gross domestic product
GEEREF	Global Energy Efficiency and Renewable Energy Fund (EU)
GEF	Global Environment Facility
GEF LDCF	GEF Least Developed Countries Fund
GEF-SA	GEF South Asia Clean Energy Fund
GGFR	Global Gas Flaring Reduction Partnership (World Bank)
GHG	greenhouse gas
H1	first half (of a fiscal year)
HEST	higher education, science, and technology strategy (AfDB)

IBRD	International Bank for Reconstruction and Development
IDA	International Development Agency
IDB	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Financial Corporation
IFI	international financial institution
IGCC	Integrated Gasification Combined Cycle
IPCC	Intergovernmental Panel on Climate Change
IREDA	Indian Renewable Energy Development Agency
JBIC	Japanese Bank for International Cooperation
KfW	Kreditanstalt für Wiederaufbau
kl	kiloliter
LAC	Latin America and the Caribbean department (World Bank)
LCGS	low-carbon growth strategy
LRT	light rail transit
MCCF	Multilateral Carbon Credit Fund
MDB	Multilateral Development Bank
MDG	Millennium Development Goals
MFI-WGE	Multilateral Financial Institutions–Working Group on the Environment
MRT	mass rapid transport
Mtpa	million tons per annum
NAPA	National Adaptation Programme of Action (Malawi)
NGO	nongovernmental organization
ODA	official development assistance
OCR	Ordinary Capital Resources (ADB)
OECD	Organisation for Economic Co-operation and Development
PPEE	National Energy Efficiency Program (Chile) (Programa País de Eficiencia Energética)
PPP	public-private partnerships
PV	solar photovoltaic or photovoltaics
RD&D	research, development, and deployment
RE	renewable energy
REDD	Reducing emissions from deforestation and degradation
RMC	regional member country
RWSSI	Rural Water Supply and Sanitation Initiative (World Bank)
SBSTA	Subsidiary Body for Scientific and Technological Advice (UNFCCC)
SCF	Strategic Climate Fund
SECCI	Sustainable Energy and Climate Change Initiative (IDB)
SEFF	Sustainable Energy Financing Facilities
SEI	Sustainable Energy Initiative (EBRD)
SIDA	Swedish International Development Cooperation Agency
SSA	Sub-Saharan Africa
SUMA	Sustainable Urban Mobility in Asia
TA	technical assistance
TAOS	The Arbiter of Storms storm surge risk assessment model
TJ	terajoule
UNFCCC	United Nations Framework Convention on Climate Change
WBG	World Bank Group
ZETP	Zero Emissions Technology Platform

All dollar amounts are U.S. dollars unless otherwise indicated.

EXECUTIVE SUMMARY

Background

The Gleneagles G8 Summit in September 2005 stimulated a concerted effort by the multilateral development banks (MDBs) to broaden and accelerate their activities on access to energy and climate change mitigation and adaptation through the Clean Energy Investment Framework (CEIF) and related programs. The CEIF and related strategies developed by the MDBs in response to this mandate focused on three pillars: energy for development and access for the poor, transition to a low-carbon economy, and adaptation to climate change. At Gleneagles, it was also agreed that a report on the implementation of the CEIF would be prepared for the 2008 G8 Summit hosted by Japan. This joint report of the MDBs responds to that request. In addition to reporting on the status of the CEIF, this report outlines the collective ambition of the MDBs with respect to assisting the developing countries in meeting the climate change challenge, their evolving strategies designed to meet these objectives, and the mechanisms through which they intend to achieve the necessary collaboration to optimize the collective impact of their climate change intervention.

In the period since Gleneagles, a number of studies have been completed that further highlight the urgency of the climate change agenda. The October 2006 Stern Review, commissioned by the U.K. government, found that the benefits of strong, early action to reduce carbon emissions considerably outweigh the costs. Furthermore, the same report points out that climate change impacts are disproportionately felt in the developing countries: the cost of climate change to poor countries could be as much as 20 percent of gross domestic product (GDP) per year compared to around 5 percent of GDP per year in the richer countries. The reasons for this uneven impact are geographic disadvantages from already high temperatures; their economies suffer greater impacts from variations in rainfall; their economies are heavily dependent on agriculture, the sector expected to be among the hardest hit by climate change; health care and other public services are already of low quality; and lower incomes make the ability to adapt to climate change more difficult. The net impact of climate change would, therefore, increase the level of poverty in developing countries, and make it harder to meet the Millennium Development Goals.

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment was delivered during 2007. Its chief findings include confirmation that the warming of the global climate system is unequivocal; global greenhouse gas (GHG) emissions resulting from human activities have grown 70 percent between 1970 and 2004; most of the observed increase in global temperatures since the mid-20th century is very likely because of the observed increase in anthropogenic GHG concentrations; impacts are very likely to be more severe because of increasing frequencies and intensities of some extreme weather events; unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed, and human systems to adapt; a broad range of stabilization levels are achievable using a portfolio of technologies that are currently available and expected to be commercialized in the next two decades; and changing development paths and technology choices can make a major contribution to climate change mitigation and vulnerability reduction.

Results of the CEIF and Related Climate Change Strategies

The MDBs, individually and collectively, had worked on several important aspects of the climate change agenda, for example, EE and renewables, well before the Gleneagles Summit. However, the Gleneagles communiqué provided the impetus for the development of a coherent and focused MDB response to the climate change challenge designed to help their clients overcome its potentially adverse implications for their respective development, transition, and poverty reduction agendas. In

the period following the Gleneagles communiqué, all the MDBs have defined overall programs, together with specific initiatives, designed to help their clients mitigate the impact of their past and future development programs on climate change, while at the same time accelerating their efforts to increase energy supply to the 1.6 billion poor who remain without access to modern energy services. In those regions where the impact of global warming is already apparent, the MDBs are also increasingly helping their clients to adapt to the new, higher-risk environment.

Access

Not only is there a major financing gap for needed energy sector investment in developing countries, about $60 billion per year, but helping governments get the sector policy framework right has also posed a major challenge for the MDBs. Providing *modern energy services to the poor,* particularly in Sub-Saharan Africa (SSA) and South Asia, where most of those without access live, has also required special attention. The MDBs have significantly scaled up their efforts in this area. For example, the MDBs' support for Africa includes action plans that aim to increase access by households from current levels of around 23 percent to 35 percent by 2015 and close to 50 percent by 2030. As a consequence, the World Bank Group (WBG) and the African Development Bank (AfDB) have seen a substantial increase in their lending for the energy sector in the last two years. For example, World Bank annual lending for energy is now averaging $4.4 billion compared with $2.3 billion three years ago, and lending for energy access has increased from about $0.8 billion to about $1.5 billion over the same period. Given that more than 80 percent of the 1 billion people in Asia that lack electricity access live in the rural areas, the Asian Development Bank (ADB) has given particular emphasis to providing finance for rural electrification projects together with related policy advice.

Mitigation

By reducing the amount of primary energy resources needed to deliver a given amount of modern energy service, EE helps to mitigate the global and local environmental impacts of fossil fuel. EE measures have been identified as the lowest-cost options available for a country to mitigate the impacts of climate change. EE is also attractive for other reasons; it increases economic competitiveness and alleviates the vulnerability to disruptions in energy markets. All the MDBs are giving priority to EE with the European Bank for Reconstruction and Development (EBRD) being recognized as a leader in developing innovative approaches by its peers. Ongoing and planned interventions by all MDBs include (a) substantially increasing their lending activities in this area, (b) screening investment pipelines for EE opportunities early in the project cycle, (c) promoting energy audits, (c) being willing to finance an increased share of total costs of EE projects, (d) targeting key countries with the highest potential impact for efficiency gains, and (e) helping clients to identify and remove institutional, regulatory, and policy barriers to efficiency gains.

A broad range of proven *renewable energy* (RE) technologies are now available, several of which are commercially viable, such as wind and geothermal, and have significant potential to improve energy access in the developing countries. Bringing these small-scale technologies online in full market volumes has become a key priority for the MDBs. These interventions include investment support, as well as steps to tackle a variety of policy issues designed to eliminate biases against renewables (for example, fossil fuel subsidies and inequitable access to transmission grids). They also increasingly include more proactive support for renewables, such as promoting regulatory and policy regimes that actively encourage renewables, capacity building, identifying local renewable resources, technology adaptation, and knowledge transfer.

The MDBs are also delivering investment and analytical support designed to *decrease emissions from thermal energy sources.* A number of interventions are being pursued, including (a) thermal power plant rehabilitation, (b) transmission and distribution network efficiency improvements, (c) upgrading of efficiency of new thermal power plants, (d) early retirement of inefficient plants and replacement with state-of-the-art facilities, (e) support for carbon capture and storage (CCS), (e) gas flaring reduction, and (f) methane release reduction. The European Investment Bank (EIB) is also systematically factoring an economic price of carbon into its economic rate of return calculations of energy projects in order to influence project choice in favor of low-carbon options.

Methane capture as part of solid waste management programs offers one of the most financially attractive climate change mit-

igation options. Given that such methane capture has the potential to be rapidly mainstreamed in the urban strategies for developing countries, several of the MDBs are adjusting their priorities to respond to this opportunity.

Estimates indicate that the *transport sector* contributes about 14 percent of global emissions, making this a key sector for climate change interventions. In 2002 the transport sector accounted for 21 percent of worldwide energy consumption and is projected to generate more than 60 percent of the increase in total energy use through 2025. The strong connection between economic growth and transport-generated GHGs can be moderated over time by changes in travel behavior, logistics decisions, technology choices, and transport modes. These factors can, in turn, be influenced by planning, fiscal, and regulatory measures, as well as through public investments in infrastructure. The MDBs are currently reviewing their transport strategies and programs with a view to making them more climate friendly. For example, the ADB has produced a pioneering study that analyzes the relationship between the transport sector and climate change in Asia; the ADB is now in the process of translating the vision contained in this report to meaningful policy and investment interventions.

Reducing emissions from deforestation and degradation (REDD) offers particularly important opportunities for mitigating GHGs in developing countries. Emissions from deforestation and land use changes are estimated to account for more than a third of their total GHG emissions each year. MDB interventions in this area have so far been quite modest, but they include promoting special financing mechanisms, capacity building, and piloting new forest conservation approaches.

All the MDBs have embarked on efforts to catalyze low-carbon investments through *new financial instruments* that can mobilize additional funding, promote innovation, and help fund the incremental costs of these projects. These efforts include a number of carbon funds and facilities administered by the MDBs, for example, the Carbon Partnership Facility, the Forest Carbon Partnership, the Congo Basin Forest Fund, the EBRD/EIB Multilateral Carbon Credit Fund (MCCF), the EIB/World Bank Carbon Fund for Europe, the EIB-sponsored Post-2012 Carbon Fund, and the Asia Pacific Carbon Fund (APCF). The availability of Global Environment Facility (GEF) grant funding has also proven to be an important catalyst for piloting innovative approaches.

In determining their country priorities, the MDBs have taken into account the differing magnitudes of GHG emissions by individual nations. For example, more than half the GHG emissions in developing countries come from Brazil, China, India, Mexico, and South Africa. These countries have made significant progress in identifying low-carbon growth opportunities within their own sustainable development strategies, a process the MDBs have made a special effort to support. In turn, this work is expected to provide the basis for a further substantial scale-up in MDB climate change support.

Adaptation to Climate Variability and Change

The earth's climate is already changing because of human activities. Developing countries, particularly in SSA, are suffering the greatest impact from climate-related disasters, which threaten to undermine their development. According to the recent IPCC report, the cost of adaptation in Africa could be as high as 5–10 percent of the continent's GDP. Climate change thus has serious implications for the MDBs' poverty reduction efforts. The MDBs whose member countries will be most affected by climate change are making efforts to help the countries adapt to climate change variability through regional and country policy and investment interventions. They are also attempting to expand their knowledge of climate risk management, build more comprehensive screening tools, and develop best-practice guidance to support their clients' long-term sustainable development goals. For example, the Inter-American Development Bank (IDB) has begun to factor climate-risk concerns into sector policies, country strategies, and project design and implementation. As a first step, the IDB is focusing on integrating adaptation issues in disaster risk prevention in its operations and in country programming, as well as developing guidelines to climate-proof infrastructure investments. The AfDB is supporting one of the first climate adaptation projects in Malawi; the project aims to improve resilience to current climate variability and future climate change by developing and implementing cost effective adaptation strategies, policies, andmeasures that will improve agricultural production and rural livelihood. The International Financial Corporation (IFC) has initiated several pilot studies to

evaluate the financial risks and climate change adaptation opportunities for private sector investments. While much analytic work has been undertaken, the current MDB financial commitment to adaptation activities remains modest. The MDBs as a group are therefore reviewing ways in which their collective efforts on adaptation can be increased. These are discussed in more detail below.

The Way Forward

The Collective Ambition of the MDBs

Based on their individual and collective experiences in implementing the CEIF, the MDBs are in the process of refining and deepening their climate change interventions to reflect emerging global and regional priorities. This includes scaling up current and developing new activities with respect to access, mitigation, and adaptation; mobilizing additional concessional funding; and developing new approaches. The overall ambition of the MDBs going forward can be summarized as a logical evolution of their climate change agendas in which the emphasis shifts from broad global aspirations toward a much more explicit focus on helping each of their country clients integrate climate change issues, including adaptation and the identification of low-carbon growth opportunities, into their own sustainable development programs. The MDBs would support this country-led approach through finance, technology transfer, and capacity building. Success in this endeavor will also require the development of enhanced MDB assistance products, significant additional increases in the staff resources devoted by the MDBs to this effort, and further improvements in the way in which they work together. These issues and plans are highlighted below.

On the assumption that these plans are realized, the MDBs would expect to see continuing and substantial growth in their collective CEIF and climate change–related lending and investment programs. Collective annual lending and investments for energy access could increase to nearly $6 billion by 2010 (in support of projects and programs totaling as much as $18 billion) Collective low-carbon annual lending and investments could reach about $11 billion by 2010 (in support of projects and programs totaling $41 billion) by 2010. These projections compare to annual average collective lending and investments for energy access of $1.3 billion and $1.9 billion for low carbon in the 2003–05 period. On the assumption that the proposed Clean Technology Fund materializes in 2008, it may be possible for the MDBs to support additional clean technology projects with a total cost of $9 billion in 2009 and $15 billion in 2010. It is important to emphasize that all the MDBs' public and private sector lending and investment programs are demand led and are ultimately determined by client governments and private investors. These are therefore projections, not targets. They are based on requests and activities currently in the pipeline and, as such, may be subject to change.

Access

Despite the progress made by the MDBs in improving energy access, power development, particularly in Africa, continues to represent one of the most difficult infrastructure challenges. Given recent levels of growth in GDP and accompanying electricity demand of 5 percent per year or more in many SSA countries, generation capacity needs to expand by about 4 GW per year, but only about 1 GW is being added annually. Serious drought in many countries has, in recent years, reduced hydropower generation, and inadequate maintenance and reliability of power systems have exacerbated the shortfalls in supply. Although it is too early to conclude that the objectives of the MDBs' action plans to increase modern energy access cannot be achieved, indications to date are that the earlier targets will need to be scaled down unless and until concessional funding and private investment are scaled up substantially. While the earlier premise that the key ingredient to mobilizing such funding was getting the sector policy framework right, progress in this area has proved to be somewhat challenging. Too many countries simply do not have the governance and capacity to establish satisfactory policy frameworks and an attractive environment to attract these funds. The MDBs are therefore trying fresh approaches, including the introduction of new technologies, such as solar lanterns, to engage the private sector, attract more concessional funds, and address the capacity and performance problems of the SSA power utilities.

Mitigation

The articulation and adoption of low-carbon growth strategies (LCGSs) is a key challenge facing all countries. This challenge is particularly difficult in the developing countries, given the key role played by energy in economic growth and the over-riding imperative of poverty reduction. As noted above, work on preparing an LCGS for the G8+5 countries (Brazil, China, India, Mexico, and South Africa), which account for more than half the GHG emissions of the developing world, is now well under way. It is important that this work now be progressively expanded to other key developing countries while at the same time maintaining the principle of country responsibility for these studies. Without such ownership, any LCGS that emerges is unlikely to be implemented. The MDBs are collectively committed to continue to assist in the finalization of these country strategies.

As the lessons of experience of the post Gleneagles period become apparent, each MDB has been engaged in a continuous process of refining their climate change interventions. Since launching their new initiatives, the MDBs have shown that scaling up investment activities can be achieved in a short time. Based on their own comparative advantage, as well as the special needs of each region, several of the MDBs have also pioneered new approaches. Since many the opportunities for climate change mitigation are accessible using the MDBs' existing and proven instruments, their key focus for future activities will be therefore to scale up the deployment of these instruments, thus promoting the transition to lower-carbon economies through demonstration of energy savings, overcoming of market barriers, and mobilization of the private sector. In the context of rising energy prices, both as a result of global market trends and as a consequence of continuing reform driving down subsidies and internal energy market distortions, EE is expected to remain a strong activity area. There appear to be significant opportunities for the MDBs to further leverage their collective efforts on thermal power and to help their clients achieve significant GHG reductions per megawatt. Under most business-as-usual international energy scenarios, coal is projected to increase the most among all energy sources worldwide. Given the exceptionally high level of CO_2 emissions from coal-fired power plants, new technology must be developed to radically reduce these emissions if reasonable atmospheric CO_2 targets are to be met. While there is significant scope for the development of RE, including hydropower, wind, geothermal, and biomass, overall RE investment and financing, with the exception of hydropower in some countries, remains very limited. It is therefore important that the MDBs continue to innovate in these areas. As mentioned above, the MDBs are also increasingly focusing on the development of strategies designed to overcome some of the barriers to accelerated deployment of advanced clean energy technologies in developing countries; this includes support for early-stage project funding for RE developers.

While the transport sector is a major and growing source of carbon emissions in the developing world, the MDBs have only begun to tackle this agenda item. In light of the enormity of this problem, the difficult policy issues involved, and the formidable challenges of implementation, the MDBs are committed to individually and collectively focusing their professional expertise on this subsector, with a view to raising its priority and developing effective interventions. Similarly, despite the importance of deforestation as a major contributor to GHGs (close to 20 percent of the total emissions), the MDBs' assistance programs in this area remain quite modest. Reducing the rate of deforestation is an exceedingly complex policy, regulatory, governance, and financial challenge, which the traditional products of the MDBs are not necessarily well suited to meet. However, given the importance of urgently tackling this global issue, the MDBs, particularly those with the most seriously affected client countries, are committed to substantially raising the priority they attach to reducing the rate of deforestation.

Adaptation

As indicated above, the work of the MDBs on adaptation to climate change remains quite modest, relative both to their mitigation activities and the global adaptation challenge. Indeed, the MDBs are still in the process of staffing up respond to these demands. This is not surprising, given that adaptation has only recently been recognized as a major global priority, and its complexity compared to mitigation. Moreover, the impact of climate change varies significantly from one region to another. For example, the clients of the AfDB will be far more seriously affected than those of the EBRD. In light of these realities, all the MDBs are developing a more ambitious and coherent set of adaptation products (investment and policy) designed to leverage

each other's strengths and build the needed staff capacities. For example, the ADB has recently initiated Promoting Climate Change Adaptation in Asia and the Pacific, and the AfDB has begun the process to develop a comprehensive climate risk management and adaptation strategy (CRMA); the EIB is reviewing its lending policy in the water sector and has established adaptation as an area of intervention alongside mitigation. To some extent, the MDBs' overall progress on implementing widespread adaptation has been hindered by the lack of sound estimates of the scope of the task and the financial implications. Developing countries are often unwilling to borrow for discrete adaptation activities and some appear to be reluctant to act until resources that are clearly "additional" to official development assistance (ODA) budgets are made available for the imposed costs of adaptation. The uncertainties are frequently even greater for private sector projects because of their shorter time horizons and more limited geographic focus; these perspectives are now being explored in IFC pilot studies. Initial World Bank estimates suggest that $1–4 billion per year would need to be directed to adaptation actions to "climate proof" global concessional finance for development.

Mobilizing the Private Sector

Success in achieving a global low-carbon growth trajectory is of course ultimately dependent on climate-friendly investments by the private sector—the expected source of more than 80 percent of investments for climate change mitigation and adaptation according to United Nations Framework Convention on Climate Change (UNFCCC) and other estimates. Given the EBRD's overall mandate, the private sector has been at the core of the EBRD's approach since the inception of the Sustainable Energy Initiative (SEI); indeed a major contributory factor for the rapid scale-up of the SEI has been its business-driven nature. For example, in 2007, 84 percent of the EBRD's €1 billion investments under its SEI went to the private sector. The IFC and the private sector arms of the other MDBs are now expanding their own programs to respond to the private sector challenge. In addition to an active dialogue with private sector interests, this includes a continuing focus on country policy and regulatory regimes to ensure a conducive enabling environment that provides the needed incentives for low-carbon and climate-resilient projects, as well as specific support for private sector operations. The MDBs can also play an important role in opening new markets, demonstrating technologies and practices, and in overcoming private sector perceptions of risk, the transaction costs of smaller projects, and behavioral inertia and low prioritization of such investments. The potential role of new donor funds (see next section) in helping to facilitate and leverage climate-friendly private investment will also be critical.

Mobilizing Additional Concessional Resources to Fund the MDBs' Climate Change Agenda

While the MDBs have made good progress in implementing their climate change agenda, the current scale of financial support is not at the levels required to address the challenges that lie ahead. The International Energy Agency's (IEA's) projection of energy investment needs of $22 trillion (2006 dollars) from 2006 to 2030 in their Reference Scenario is split roughly 50-50 between developing countries and the Organisation for Economic Co-operation and Development (OECD) plus transition economies. The World Bank estimates that the incremental cost to enable power investments in developing countries to reach a low carbon threshold were of the order of $30–40 billion per year. Global incremental costs for a low-carbon trajectory, including all sectors, are estimated to be $100–500 billion per year. Existing financing addresses only a very small component of this total requirement. Over the long term, the gap may be filled by some combination of a growing market for carbon trading and policy instruments, such as carbon taxes following a post-Kyoto global agreement. However, in the interim, concessional financing is critical to catalyze increased flow of commercial capital and to support early action by the developing countries to address the challenges of climate change.

In this context, the MDBs, working with developed and developing countries and other stakeholders, have proposed the establishment of the **Climate Investment Trust Funds** comprising two new trust funds, one for scaling up investments in low-carbon technologies and the second to support various programs to test innovative approaches to climate change. Donor contributions to the Climate Investment Trust Funds would be new and additional to existing ODA funding levels. The **Clean Technology Fund (CTF)** would provide scaled-up

financing to contribute to demonstration, deployment, and transfer of low-carbon technologies with a significant potential for long-term GHG emissions savings. It would provide positive incentives through grant elements tailored to cover the identifiable additional costs of low-carbon investments necessary to make a project viable. The **Strategic Climate Fund (SCF)** would include targeted programs with grants or concessional finance considered as the preferred instrument, depending on the activity and its mix of local and global benefits. The first program would pilot national level actions for climate resilience in a few highly vulnerable countries. Other programs under consideration are to reduce deforestation and forest degradation and to promote improved sustainable forest management.

Working Together: Strengthening the Partnership

It is evident from the foregoing that the MDBs share a common vision on approaches and actions to tackle the challenge posed by climate change. Prior to Gleneagles, they had worked together in such areas as EE, RE, clean coal technologies, urban transport, forestation, and environmental protection, all of which have a direct impact on climate change. Cooperation included cofinancing of key projects, as well as joint or closely coordinated country policy advisory work.

These joint efforts have accelerated and become much more intense in the post-Gleneagles period. In particular, each MDB has consulted closely with the others based on their respective comparative advantages, and in the process developed and revised their individual climate change and energy strategies to respond to the new global priorities. The result is an increasingly consistent set of policies, programs, and instruments across the international financial institutions (IFIs). Further initiatives, designed to increase the level of collaboration, are under way; they are considered critically important as the pace of implementation picks up and as new sources of financing for climate change programs, such as the proposed Climate Investment Trust Funds, become available.

The sheer scope and complexity of the climate change agenda and the overriding imperative for coherence and consistency on the part of the MDBs require that they further strengthen collaboration with respect to their analytical work and related methodologies. For example joint work on developing a harmonized approach to the assessment and reporting of portfolio GHG emissions (carbon foot printing) is under way. This exercise will, among other things, provide the basis for measuring and monitoring the climate change performance of the MDBs with respect to outcomes. In addition, and while not used for decision-making purposes, several of the MDBs have begun to pilot shadow price carbon in their economic analysis of projects. The MDBs are also committed to working together in preparing and financing larger low-carbon projects, such as CCS.

As the MDBs progressively broaden and deepen their climate change activities, it is important that the lessons of experience are promptly shared across the institutions and more importantly with the clients themselves. The MDBs have therefore committed themselves to establish more systematic knowledge exchange mechanisms. This effort is expected to include establishment of thematic groups across the banks. Such groups would be organized by topic—for example, renewables, coal-fired plant technologies, EE, and adaptation—and would include all staff working on these issues across the MDBs. As the MDBs' climate change activities expand, it has also been increasingly important that each knows what the others are doing at the operational level, both to leverage their individual efforts and to help identify key gaps. In this connection, the MDBs have established a common data base on their activities. This site, which the MDBs are committed to updating regularly, is accessible at www.worldbank.org/environment/ccandmdb.

Finally, the MDBs are in the process of strengthening the formal governance mechanisms designed to ensure the needed cooperation, particularly at the operational level. Specifically, the MDB committee, which will be established as a part of the governance framework for the CTF, will, among other things, assume direct responsibility for collaboration, coordination, and information exchange across the institutions.

1: BACKGROUND AND OBJECTIVE OF THE REPORT

The 2005 Gleneagles G8 Summit in July 2005 stimulated a concerted effort of the MDBs to broaden and accelerate programs on access to energy and climate change mitigation and adaptation through the CEIF. Over the last two years, largely through the CEIF adopted by MDBs, recognition of the vital role the MDBs play in addressing the global challenges posed by climate change has emerged. MDB public and private sector operations are increasingly called upon by client countries and the international community to help developing countries achieve their poverty reduction and economic growth objectives in a manner that is resilient to climate impacts and that mitigates their contributions to GHG emissions.

At the Gleneagles Summit, it was agreed that a report on the implementation of the CEIF would be prepared for the 2008 G8 Summit hosted by Japan. This joint report of the MDBs to the G8 Summit in Hokkaido is intended to provide information on the outcomes and lessons learned under the CEIF, describe the collective MDB objectives for addressing the energy access and climate change challenges, and outline how the MDBs plan to build on the CEIF experience to date to more fully achieve these objectives.

The report builds upon the "The Multilateral Development Banks and the Climate Change Agenda" report that was presented at the December 2007 Bali Climate Change Conference. This report describes actions taken by each MDB to develop climate change strategies and programs of actions tailored to their particular client needs, based on resources and funding mechanisms currently available. Under the CEIF, the MDBs have strengthened collaboration on analytical work and programming and committed to expand this collaboration to optimize the impact of their collective actions. Through the initial stage of joint work, a monitoring system has been established to assist joint tracking of climate change–related operations. Joint sector work is also under way, including the development developing common methodologies for monitoring the carbon footprint of MDB operations.

In addition to reporting on the status of the CEIF, this report outlines the collective ambition of the MDBs with respect to assisting the developing countries in meeting the climate change challenge, summarizes their evolving strategies designed to meet these objectives and the mechanisms through which they intend to achieve the necessary collaboration to optimize the collective impact of their climate change interventions.

2: AN OVERVIEW OF DEVELOPMENTS SINCE GLENEAGLES

The 2005 Gleneagles communiqué on climate change recognized the "serious and linked challenges of tackling climate change, promoting clean energy, and achieving sustainable development globally." The communiqué encouraged the MDBs to increase dialogue with client countries on climate change mitigation and adaptation activities. The World Bank was requested to take leadership in developing a framework for clean energy and development, including investments and financing. In response to this call, all the MDBs have finalized strategy papers and commenced implementation of their new initiatives, policies, and programs.

The development of a CEIF focuses on three pillars: (a) energy for development and access for the poor; (b) transition to a low-carbon economy; and (c) adaptation to climate change. The perspective of developing countries regarding the clean energy challenge differs depending on income levels. Lower-income countries have the dual related challenges of economic growth and poverty alleviation through increasing access to modern energy while middle-income countries assign a high priority to economic growth. All client countries have made it clear that the climate change agenda must be addressed in the context of these priorities.

The development trajectory of developing countries, based on current policies, is not unlike that of OECD countries in the post-industrialization era starting in the late 19th century. Economic growth accelerated considerably in Western Europe and North America driven by replacing labor with machines and further reinforced by changes in transportation and the application of electricity. All of these changes were dependant on a rapid increase in energy use, principally coal, oil and hydropower. Not coincidently, this was also the time at which CO_2 emissions into the atmosphere accelerated. The problem of CO_2 emissions is further exacerbated by the fact that, unlike many other airborne pollutants, CO_2 remains in the atmosphere for about 100 years. The challenge, thus, is how to continue economic growth in OECD countries and accelerate economic growth in developing countries in a manner that respects the need to decrease the risk of unraveling these gains because of the negative impacts of climate change.

In 2005, the then Chancellor of the Exchequer in the U.K. Government commissioned a team led by Sir Nicholas Stern to undertake a study on the economics of climate change. The report, which was released in October 2006, represented a watershed in the thinking on the challenges associated with climate change. The report is not without controversy, but its conclusions have generally been well received. The economic analysis finds that the costs of climate change impacts and adaptation, of at least 5 percent of GDP each year, are sufficiently higher than the estimated costs to reduce GHG emissions—about 1 percent of global GDP annually—to warrant that a high priority be assigned to mitigating GHG emissions. The report concludes: "…the evidence gathered by the review leads to a simple conclusion: the benefits of strong, early action considerably outweigh the costs."

Furthermore, the Stern Report points out that climate change impacts are disproportionately felt: the cost of climate change to poor countries could be as much as 20 percent of GDP per year The reasons for this uneven impact are that geographic disadvantages have resulted from already high temperatures; their economies suffer more from variations in rainfall; their economies are heavily dependent on agriculture, the sector expected to be among the hardest hit by climate change; health care and other public services are already of low quality; and lower incomes make the ability to adapt to climate change more difficult. The net impact of climate change would, therefore, increase the level of poverty in developing countries.

But what does 1 percent of global GDP mean in terms of costs? To put this in context, if the global GDP on a public-private partnerships (PPP) basis is $70 trillion, the annual mitigation costs would be $700 billion. The increase in oil prices in the past 5 years represents an annual increase in cost of more than $2 trillion—if oil prices were roughly $30 per barrel less than today's prices, the savings would be roughly the same as the total

expected cost of mitigation. The IEA's estimate of annual global energy subsides is more than $250 billion—about 35 percent of the estimated cost of mitigation.

The IPCC Fourth Assessment was delivered during 2007, building on the Third Assessment delivered in 2001. The chief findings in the Synthesis Report are as follows:

- Warming of the climate system is unequivocal.
- Many natural systems are being affected by regional climate change.
- Global GHG emissions resulting from human activities have grown 70 percent between 1970 and 2004.
- There is very high confidence that the global average net effect of human activities since 1750 has been one of warming.
- Most of the observed increase in global temperatures since the mid-20th century are very likely a result of the observed increase in anthropogenic GHG concentrations.
- With current climate change mitigation policies and related development practices, global GHG emissions will continue to grow over the next few decades.
- For the next two decades, a warming of about 0.2º C per decade is projected for a range of scenarios.
- Anthropogenic warming and sea level rises would continue for centuries even if GHG concentrations stabilize, because of the time scales associated with climate processes and feedbacks.
- Equilibrium climate sensitivity is very unlikely to be less than 1.5º C.
- Impacts are very likely to increase because of frequencies and intensities of some extreme weather events.
- Unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed, and human systems to adapt.
- A wide range of mitigation options is currently available or projected to be available by 2030 with costs ranging from negative up to $100/t CO_2e and would reduce emissions to below current levels by 2030.
- A large range of stabilization levels are achievable using a portfolio of technologies that are currently available and expected to be commercialized in the next two decades.
- Changing development paths can make a major contribution to climate change mitigation.
- Decisions about macroeconomic and other policies that seem unrelated to climate change can significantly affect emissions.

In summary, the Fourth Assessment report underscores the recommendations of previous reports: climate change is an urgent and important issue, but meaningful changes can be made using technologies that are already known.

3: RESULTS OF THE CEIF AND RELATED CLIMATE CHANGE STRATEGIES

The MDBs, individually and collectively, had worked on several important aspects of the climate change agenda, for example, EE and renewables, well before the Gleneagles Summit. However, the Gleneagles communiqué provided the impetus for the development of a coherent and focused MDB response to the climate change challenge designed to help their clients overcome its potentially adverse implications for their respective development, transition, and poverty reduction agendas. In the period following the Gleneagles communiqué, all the MDBs have defined overall programs, together with specific initiatives, designed to help their clients mitigate the impact of their past and future development programs on climate change, while at the same time accelerating their efforts to increase energy supply to the 1.6 billion poor who remain without access to modern energy services. In those regions where the impact of global warming is already apparent, the MDBs are also increasingly helping their clients to adapt to the new, higher-risk environment. As part of this process, the MDBs have set themselves a number of targets:

- The EBRD's SEI committed the institution to more than doubling its investments in EE and cleaner energy during the 2006–08 period to more than $2.2 billion in projects, with total costs of more than $7.3 billion.
- The ADB is in the process of expanding its clean energy operations to reach $1 billion a year. In May 2008 the ADB also approved a new Climate Change Fund (utilizing a proportion of its own 2007 net income) that will provide further financial and technical assistance support so that more clean energy and low-carbon projects can be developed in the Asia Pacific region.
- The EIB has adopted an overarching strategy designed to consolidate and mainstream its activities in the field of climate change. Mitigation and adaptation projects benefit from up to 75 percent financing (rather than the usual 50 percent cap) and longer loan maturities without any geographical limitation or aggregate cap. This includes support for the European Union's (EU's) flagship program that plans to support up to 12 CCS power plants.
- The AfDB has recently approved a "Clean Energy Framework for Africa," which commits the institution to an ambitious program for expanding energy access on the continent, while at the same time maximizing clean energy options, emphasizing EE, and participating effectively in international carbon credit markets. The AfDB also plans to finalize a new climate change adaptation strategy by the end of 2008 and in the interim has announced a program to provide financial support to 5–10 climate "adaptation" projects a year by 2010.
- The IDB is in the process of establishing targets for expanding its sustainable energy operations to reach up to $1.5 billion per year during the period 2008–12.
- The WBG committed to increasing its EE and renewable lending by 20 percent a year beginning in fiscal 2005 and has met these targets every year.

The MDBs either already have or will exceed their enunciated targets; the following paragraphs summarize the highlights of their ongoing programs designed to achieve these collective and individual goals.

Increasing Energy Access

Most poor people without energy access live in SSA and South Asia. South Asia has the largest number of people without access to energy (nearly 600 million); however as a percentage of the total population, SSA is much worse off and the gap is growing. Improving supplies of modern energy services has therefore posed a particular challenge for the AfDB, the ADB, and the World Bank. In a report issued in September 2006, the World Bank concluded the following:

- There is a financing gap for the energy sector in developing countries of about $80 billion per year.
- Decreasing the electricity sector financing gap is primarily an issue of getting the sector policy and governance framework right.

- Demand management, optimal generation planning, electricity trade across countries, and joint investments in regional projects can significantly reduce the volume of incremental investment needs.
- The MDBs' existing instruments are adequate to meet energy financing needs.
- Providing access to modern energy services to the poor calls for special attention.
- An action plan for energy access with special emphasis on SSA is needed, with the aim of increasing access from 23 percent to 47 percent by 2030.
- The action plan would require concessional support to double to $4 billion per year.
- IDA 14 would not be sufficient to accommodate this program, and additional support would be needed, with close cooperation with the AfDB.

In March 2007, the Action Plan was issued. It called for total energy support of more than $10 billion during fiscal 2006–08 from the WBG, Carbon Finance, and GEF. It supported the Africa energy scale-up action plan that, with partners, aimed to increase the percentage of households with access to modern energy to 35 percent by 2015 and 47 percent by 2030 from the then-estimated level of 25 percent. It proposed annual energy investments to double to $4 billion per year, IDA commitments of $700–800 million per year, and $200 million per year of IFC commitments. The AfDB recently adopted broadly similar African targets, although its longer-term goals are somewhat more ambitious (see section 4 below). Given that about 1 billion of the 1.6 billion people who do not have access to electricity are in the Asia Pacific region, the ADB is now developing a new strategic approach to support scaling up access to energy projects for the poor under its Energy for All initiative. The ADB has given particular emphasis to providing finance for rural electrification projects, together with policy advice, especially on subsidy and cost recovery mechanisms. For example, the Pakistan Renewable Energy Development Sector Investment Program ($115 million) supported by the ADB combines physical investments in new generating capacity across four provinces with interventions in policy reform, capacity development, governance, regulatory, and legal frameworks. The Bangladesh Sustainable Power Sector Development Program: Natural Gas and Hydro Generation, Transmission and Distribution Efficiency Improvement ($465 million) includes the installation of 2 x 15 MW gas-fired power plant, transmission and distribution efficiency improvements, and capacity building. The project will increase access to electricity from the current 38 percent to the projected 60 percent of the national population by 2015 and will reduce load shedding from 770 MW in 2005 to less than 470 MW in 2009 and to zero by 2015. The ADB is now considering scaling up the Power Fund for the Poor in Sri Lanka to increase access to grid connection through microfinance institutions. Similarly, the ADB is developing projects in Bangladesh, and Vietnam to scale up solar home systems, and rural electrification both on-grid and off-grid for the poor, respectively, which will contribute significantly on increasing access to energy.

WBG lending for energy has exceeded $11 billion for the period fiscal 2006 to the first half (H1) of fiscal 2008, exceeding the target of $10 billion during the fiscal 2006–08 period. Furthermore, Pillar 1 of the CEIF is well into the implementation phase. CEIF has made energy access in IDA countries a top priority. The WBG's energy lending increased from an annual average of $2.3 billion between fiscal 2003 and fiscal 2005 to reach an annual average of $4.4 billion between fiscal 2006 and H1 fiscal 2008. Energy financing to IDA countries has also increased significantly from an annual average of $0.9 billion between fiscal 2003 and fiscal 2005 to an annual average of $1.8 billion between fiscal 2006 and fiscal 2007. Despite these enhancements, energy access remains a policy and financing challenge in all regions, especially in SSA (see section 4 below).

WBG financing for the energy sector in SSA increased appreciably in fiscal 2007 and continues to be strong in fiscal 2008. The WBG's energy lending for SSA increased from $1.4 billion for the fiscal 2003–05 period to $2.4 billion for the period fiscal 2006 to H1 fiscal 2008. Carbon finance and the GEF funded $23 million and $13 million of low-carbon projects, respectively. A good example of the broad-based support that IDA provides to the sector is the $296 million in grant financing for the Regional and Domestic Power Markets Development project for the Democratic Republic of Congo, approved in fiscal 2007. The project, critical to DRC's energy needs, as well as to the future development of regional energy trade in southern Africa, will leverage a total investment of $500 million to (a) increase hydropower capacity

through rehabilitation of the Inga generation facilities; (b) boost transmission capacity between Inga and Kinshasa; (c) extend electricity access to areas of Kinshasa; and (d) enhance the capacity of the government and utility to improve service. Efforts to leverage public resources through large private sector–led projects, particularly in generation capacity, have been successful in some cases, such as the $800 million, 250 MW Bujagali project in Uganda, which mobilized about $260 million in private funding and $540 million in public funding, including about $370 from IDA, MIGA, the IFC, the AfDB, and the EIB in the form of loans and guarantees; however, overall funding to SSA's energy sector remains well below the levels projected in the Bank's Action Plan.

Mitigation

Energy Efficiency

By reducing the amount of primary energy resources needed to deliver a given amount of modern energy service, EE helps to mitigate global and local environmental impacts of fossil fuels. EE measures are often cited as the lowest-cost options available for a country to mitigate the impacts of climate change. EE is also attractive, as it increases economic competitiveness and alleviates the vulnerability to disruptions in energy markets.

The EBRD has been recognized by other MDBs as a leader in promoting and financing EE, which is a key strategic orientation of the bank's current Capital Resources Review (five-year strategy for 2006–10) and Energy Operations Policy. The SEI committed the EBRD to sustainable energy investments of $2.2 billion between 2006 and 2008, more than double the level of the previous period. This, in turn, was expected to catalyze total investment of around €5 billion. Together with the development of the SEI, the EBRD has taken a number of steps to fully mainstream its EE activities across its sector and geographic teams. This has included using the corporate planning function to fully integrate its EE priorities into its line operations. In this connection, the investment pipeline is systematically screened, so as to identify EE opportunities early in the project cycle.

The specific components of the EBRD's SEI have been defined based on a sector assessment of GHG emissions in the region, of reduction potential, of the extent and complexity of barriers to increased investment for emissions reduction, and of the level of bank experience and operational capacity. Based on this assessment, the SEI aims to accelerate the pace of direct investment in EE projects across industrial sectors. The SEI supports the expanded reach of the bank's energy audit program for large energy users in the countries of operations and implementation support in the form of energy management training to (a) ensure that sustained EE gains are achieved, and (b) expand the development and implementation of sustainable energy financing facilities (SEFFs) to small and medium enterprises and to the residential sector across its countries of operations. The SEI supports market studies to identify specific EE requirements in each target country, the development of skills in local banks to assess EE projects, and achievement of EE savings and small RE investments.

From its launch in May 2006 to the end of 2007, EBRD SEI financing had reached more than $2.5 billion, already exceeding the SEI original three year target and by the end of the first quarter of 2008, EBRD SEI financing reached close to $3 billion. The results achieved to date reflect a systematic approach to the mainstreaming of SEI activities within the operations of the EBRD. This mainstreaming across sector and geographic teams has been a major factor in the speed and magnitude of the scaling-up of EBRD sustainable energy financing in the context of the CEIF. Total reduction in carbon emissions achieved by EBRD SEI projects is estimated at around 11 million tons per annum (Mtpa) of CO_2. In 2007, 51 SEI project components were assessed for energy savings and CO_2 emission savings. The energy-saving measures financed would, for the same level of economic activity, reduce primary energy use by almost 100,000 terajoules (TJ) and carbon emissions by more than 6 Mtpa of CO_2. About two-thirds of SEI investments have been in projects targeting industrial EE and cleaner energy production. Municipal infrastructure EE investments covering district heating network rehabilitation, public transport and residential EE, have also been significant. The EBRD also promotes sustainable energy through targeted credit lines to local banks called SEFFs. A SEFF includes a credit line or guarantee from the EBRD to local banks, specifically dedicated for onlending to EE projects in the corporate, municipal and residential sectors or for small-scale RE

generation. These credit lines are supported by a comprehensive technical assistance package that ensures that the objectives of the financing are met and that long-term capacity for financing sustainable energy is built into the market.

EE has been an important consideration in the EIB's lending since the 1970s oil shocks. Lending to EE projects decreased from mid-1980s, although it has gained more prominence in the last few years, given in particular the EU policy objective of achieving 20 percent reduction in energy consumption by 2020. EE is mainstreamed into the EIB's decision making, and most of the EIB's projects result in an improvement in EE for the simple fact that they usually incorporate the most modern technologies. However, the EIB only seeks to justify a loan on EE grounds when there is significant cause (at least 20 percent reduction in energy consumption compared to the situation before the project was implemented or when EE can justify a substantial part of the investment). EIB has made progress in the financing of dedicated financial instruments for EE, notably instruments for small projects and instruments that allow the blending of technical assistance with grants. In addition, it is contributing to the development of innovative risk sharing instruments and PPPs with EE agencies and energy service companies (ESCOs) for investments in building and in small and medium enterprises. The EIB is also involved in energy audits and other technical assistance to selected project promoters (that is, promoters with weak capacities in this area) when funds are available—including using JASPERS and JESSICA.[1]

The ADB has established a comprehensive Climate Change Program to help its DMCs to achieve significant, measurable change in their energy use patterns and to secure a sustainable, low-carbon energy future, as well as prepare with plans, policies, and infrastructure to withstand future climatic conditions. A pivotal component of the Climate Change Program is the Energy Efficiency Initiative (EEI) that was launched in July 2005 and that targets expansion of the ADB's operations in clean energy to $1 billion per year starting 2008.

The EEI is being implemented in three phases. Phase I, the initiation phase, was completed in June 2006 with endorsement by ADB management of the draft EEI report, which firmly establishes the rationale for expanded and sustained ADB action and EE-related investment defines the general principles of the EE investment and action plan, and provides priorities and a framework for next steps. The ADB has identified China, India, Indonesia, Pakistan, the Philippines, and Vietnam as priority DMCs, with the potential to make greatest impact toward reducing CO_2 emissions in Asia and the Pacific. Under Phase II, which is ongoing, the ADB has been conducting consultative meetings in these countries to learn firsthand from clean energy market stakeholders the barriers, catalyzing conditions, and immediate investment opportunities prevailing in each DMC market as a prerequisite step to local clean energy project pipeline development. In some of these DMCs, the ADB is providing assistance in the formulation of a broader strategic framework for external assistance or new legislation intended to accelerate the implementation of new energy efficiency (EE) and other clean energy projects. The ADB has made available $2.9 million to deliver the following outputs from October 2006 to April 2009: (a) country action plans and project pipelines for clean energy investments in DMCs; (b) design and establishment of Clean Energy Financing Partnership Facility; and (c) development of the necessary management structure and capacity building in the ADB to scale up, as well as monitoring and evaluation activities implemented under EEI. Work undertaken thus far under the EEI has already led to an increase in the ADB's investments in clean energy. As an example, during the five-year period 2003–07, the ADB's total investments in clean energy projects totaled more than $2.7 billion. This figure comprises $916 million for EE, $506 million for RE, and $1.34 billion for clean fuel. The pipeline for clean energy projects for 2008–10 exceeds $8.0 billion. The ADB established the Clean Energy Financing Partnership Facility in April 2007. It is designed to finance (a) smaller EE investments that require quick and efficient transactions; (b) technology transfer costs of clean technologies for a small number of high demonstration impact, large interventions that will catalyze deployment of clean energy technologies; and (c) grant assistance for activities such as developing the knowledge base and incentive mechanisms, advocacy, institutional capacity building, project preparation, and establishment of the monitoring and evaluation mechanisms. The strategies and action plans will be implemented in Phase III (2008–10).

1 Joint Assistance to Support Projects in European Regions and Joint European Support for Sustainable Investment in City Areas, respectively.

The ADB is on track to meet its clean energy investment target of $1 billion a year by 2008. Investments include district heating in the China and power sector loans in India. The ADB has also made significant progress in assisting its clients to develop EE action plans. Examples include China, India, Indonesia, Pakistan, the Philippines, and Vietnam. China where the ADB is currently assisting the National Development and Reform Commission to develop innovative mechanisms to scale up financing for EE and RE projects to meet the government's 2010 energy intensity reduction targets; in India where EE opportunities in the power sector and natural gas subsectors are being developed; the finalization of a baseline assessment of the EE market in Indonesia; the establishment of a long-term EE program in Pakistan; the design and funding assistance for a seven-year multisectoral EE program in the Philippines; and the drafting of new EE legislation in Vietnam.

The WBG has been active in promoting EE since the early 1990s. Following the publication of the World Bank policy paper, "Energy Efficiency and Conservation in the Developing World," in 1992, EE issues were mainstreamed into country policy dialogue, and World Bank financial instruments were deployed in support of EE interventions along the entire energy supply chain. For the past 16 years, the WBG has been engaged in promoting EE, having financed investments totaling $2.2 billion for more than 100 projects in more than 40 countries. The projects span all regions, with a significant concentration in Europe and Central Asia, and East Asia and the Pacific, and in a few sectors, in particular the delivery of district heating and electric power services. In fiscal 2006, the WBG committed $490 million for EE projects that addressed the full range of end use and supply side opportunities and were also designed to help remove institutional, regulatory, financial, and technical barriers.

The WBG's commitment to EE has been further reinforced through the key role it is playing in leading the global cooperative efforts to reduce GHG emissions through the CEIF. In this regard, an Energy Efficiency for Sustainable Development (EEfSD) action plan has been prepared by the Bank, designed to scale up the World Bank's EE operations in client countries. These interventions are structured along four tracks to permit countries to take advantage of EE opportunities in priority sectors: Track 1—Integrating Energy Efficiency within Economic and Sector Work, Track 2—Mainstreaming Energy Efficiency in Investment Operations, Track 3—Improving Internal Operational, Learning and Analytic Capacity, and Track 4—Monitoring, Evaluation, and Outreach.

The EEfSD strategy comprises interventions at three levels: (a) policy and regulatory, (b) sector and subsector, and (c) end use equipment and appliances. The emphasis is on scaling up on the demand side, in addition to continuing the work on supply side efficiency improvements. Lighting Africa, a WBG program developed to increase access to modern lighting services in SSA, recently received the necessary funding for full mobilization. Its goal is catalytic: to mobilize the private sector to reach 250 million "energy-poor" customers by 2030 with low-cost, reliable, affordable lighting services in support of achieving the Millennium Development Goals. The program is designed to facilitate the entry of efficient lighting programs as a WBG lending product, starting in fiscal 2008.

More generally, the WBG has strengthened its investment support for low-carbon energy projects. The share of support for low-carbon energy projects increased from an average of about 28 percent between 2002 and 2005 to 40 percent between 2006 and 2007. By December 2007, one and a half years ahead of schedule, the WBG exceeded its Bonn commitment[2] of investing $1.9 billion in new RE and EE for the mid-2004 to mid-2009 period. Total commitments for new RE and EE for this period have already reached $2.3 billion.

The IFC has successfully pioneered clean energy financing through financial intermediaries with GEF and other donor support for more than a decade. Projects in Eastern Europe, Russia, China, and (soon) the Philippines rely on a combination of technical assistance and partial risk guarantees to engage local banks in clean energy lending. This approach is being internalized by the IFC's Financial Markets Group, which has set a target of $500 million in annual commitments for such projects by 2009. The IFC's performance standards require identification, quantification, and reporting of projects resulting in GHG emissions of 100,000 tons CO_2 per year (directly or indirectly through electricity consumption).

2 At the International Renewable Energies Conference in Bonn Germany in June 2004, the WBG committed to increasing its lending for new RE and EE by an average of 20 percent per year from fiscal 2005 to fiscal 2009 from $209 million, the average over the previous three years. New RE comprises solar, wind, biomass, geothermal, and hydropower with capacities up to 10 MW per facility.

The IDB is working to mainstream EE in its projects. Each new project is assessed for its EE potential. Where feasible, the IDB is offering an integrated EE program, which includes an audit, as well as support for investment in efficiency measures, maintenance, and training. Such audits have been completed for projects in the water sector, various industrial sectors, and thermal power plants. The Bank is also providing country-level assistance in assessing EE opportunities in key sectors. Operational interventions to date include Chile's National Energy Efficiency Program (Programa País de Eficiencia Energética, PPEE) where Sustainable Energy and Climate Change Initiative (SECCI) is supporting the development of EE (and carbon finance) programs to be financed by the GEF. Projects currently under preparation include a pilot Guarantee Program for EE projects in Mexico being structured with Bancomext, the Usiminas (Usinas Siderurgicas de Minas Gerais, S.A.) Energy Efficiency Program in Brazil, and improving the efficiency of water pumping stations in Nicaragua (in cooperation with Canadian bilateral assistance). The IDB is also financing EE in water-pumping systems in El Salvador and efficiency improvements in lighting in the residential, service, and commercial sectors in Central America and Chile. It is collaborating with commercial banks and energy services companies on cofinancing EE in public buildings in major cities in Latin America. In addition, the IDB is providing assistance to countries in reviewing regulatory, institutional, and financial frameworks for EE in order to create a proper environment for investments, as well as financing pilot projects for the application of emerging EE technologies. It is also working together with the World Bank and the IEA in developing EE indicators in Brazil and Mexico in order to provide important baseline information on energy consumption and efficiency. Finally, the IDB in the past year has financed a number of projects to develop innovative business models for EE services.

As part of the proposed Clean Energy Access and Climate Adaptation Fund for Africa (CECAFA) program, the AfDB will progressively look at EE issues related to the generation and distribution of electricity, particularly as part of its ongoing support to the regional power pools. The AfDB will support clean-stove technologies, capacity building for EE audits and appliance standards regulations, as well as assist in the preparation of EE projects (for example, energy-efficient lighting). In particular, the CECAFA will be focused on policy and regulatory issues relating to supply side EE and demand management. The AfDB, in collaboration with the World Bank and bilateral agencies, will provide financing and technical assistance to African governments and local authorities to strengthen the efficiency aspects of energy policy and regulatory frameworks and implementation capacities. On the energy supply side, support (financing, advisory services, technical assistance, and capacity building) will be provided to energy and power utilities to undertake EE audits and devise and implement strategies to enhance technical efficiency at the generation, transportation, storage, and local distribution stages of electricity and fuel supplies. Particular attention will be paid to enhancing the efficient functioning of regional power pools, energy markets, and fuel supply systems.

On the demand side, the AfDB will promote the levying and collection of adequate user fees by utilities (including sound subsidies for poor segments of the population) as an important instrument in promoting EE and conservation. Support will be given to government efforts to set and monitor EE, safety, and health standards for appliances used in domestic and micro to small business establishments (including agro-industry and light manufacturing). Under the AfDB's higher education, science, and technology strategy (HEST), support will be provided for strengthening vocational training programs to generate skilled labor for proper maintenance of mechanical appliances. The AfDB will support government programs and efforts of nongovernmental organizations (NGOs) to introduce more efficient and cleaner (smokeless) wood, charcoal, and coal cookstoves in the rural areas where households continue to rely on these sources of energy for food preparation. Also, as a demand side efficiency measure, the AfDB will finance government programs to phase out incandescent bulbs and replace them with low-energy compact fluorescent lights, and will consider extending financing on commercial terms to private enterprises keen on building production and distribution capacity for such bulbs in African countries.

Renewable Energy

A broad range of proven RE technologies are now available of which a few have reached commercially viability and have significant potential to improve energy access in the developing

countries. Bringing these small-scale technologies online in full market volumes therefore is a key priority for the MDBs. These interventions include investment support and steps to tackle a variety of policy issues designed to eliminate biases against renewables—for example, fossil fuel subsidies and inequitable access to transmission grids. They also increasingly include more proactive support for renewables, such as promoting regulatory and policy regimes that actively encourage renewables, capacity building, identifying local renewable resources, technology adaptation, and knowledge transfer.

The World Bank has played an active role in promoting RE since 1990, providing $7.2 billion in financing ($2.7 billion excluding hydropower >10 MW). Its RE projects are spread around the world, with a significant focus in Africa, Asia, and Latin America. The WBG's work on RE is pursuing a two-pronged approach targeting, on the one hand, the supply of energy in the short to medium term and, on the other hand, providing assistance to developing policy and building capacities for scale-up of RE use. In fiscal 2007, the total lending for new RE projects was $421 million. Investments, policy support and training, capacity building, and knowledge dissemination are key activities to increase the use of RE. Economic Sector Work (ESW) and Analytic and Advisory Services are under way, with the support of the Energy Sector Management Assistance Program (ESMAP) to strengthen the policy and institutional frameworks for developing long-term energy development plans, including formulating laws and regulations for encouraging greater use of RE. Hydropower investments will include rehabilitation of existing plants, small run-of-river plants, and multipurpose hydropower plants with reservoirs. These types of projects can demonstrate the significant impact that partnerships between the WBG, government, and the private sector can make in this effort. Box 1 showcases three private sector–oriented WPG projects based on conventional as well as new RE sources. Other recent examples of RE projects supported by the WBG include the Ghana Energy Development and Access project, which provides grants to developers of RE generation projects—such as small hydropower, wind, and biomass—for the benefit of communities outside the main national grid system, as well as support for the establishment of an independent Rural Electrification Agency, which will coordinate all rural electrification programs, and the Kenya: Olkaria II Geothermal Expansion project guaranteed by MIGA, which consists of the design, construction, management, and operation of a base-load geothermal power plant with a combined capacity of 48 MW on a build-own-operate basis in the Olkaria geothermal fields of the Rift Valley. Two solar thermal power projects cofinanced by the GEF (Mexico and Morocco) were approved in fiscal 2007, and the third (Egypt) was approved in December 2007. The Mexico Wind Umbrella Project, approved in 2007, is using carbon finance to stimulate new wind-field developments.

The World Bank has recently completed a report on ethanol production in Brazil that highlights the unique comparative advantage of Brazil in producing ethanol. The sugarcane feedstock production costs are about a third lower than in the next lowest countries. Producing ethanol from sugarcane in the central south of Brazil does not suffer from secondary costs: the sugarcane production in this region is rain fed and not dependent on energy demanding irrigation. As the cost of sugarcane accounts for about 60 per cent of the production costs of ethanol, Brazil's low production costs make ethanol competitive to gasoline as an input to transport services. The strongly increased availability of flex-fuel vehicles has increased the attractiveness of building hybrid sugar-ethanol complexes. The Bank is exploring ways to facilitate lessons learned from Brazil's experience to foster South-South cooperation.

The IFC has also been very active in supporting a diverse portfolio of RE technologies as documented in its recent publication, "Selling Solar: Lessons from More than a Decade of IFC's Experience." This experience includes several forms of financing programs (see box 1), including specifically tailored programs for distributed generation, solar photovoltaic (PV) companies, and small and medium enterprises. Some important lessons were also learned from unsuccessful projects including a clean energy equity fund, successfully restructured to provide patient capital and business planning assistance to small clean energy firms. In addition, with GEF and other donor support, the IFC has funded several early stage new technologies including a 1 MW grid-connected PV facility in the Philippines (the largest such project in a developing country), a stationary fuel cell supplier in South Africa, and most recently low-power lighting devices in Africa and a new technology for generating power from sugarcane wastes in Brazil.

Box 1: World Bank Group Support for Private Sector Participation in Renewable Energy Projects

The WBG has a range of instruments to support private sector participation in RE projects: IFC lending and investment products for the private sector, GEF, and carbon financing, as well as Bank guarantee instruments for both debt and equity. The following are three examples of such interventions:

The Nam Theun 2 Project in Laos is designed to supply 1,070 MW of RE electricity to both Thailand (995 MW) and Laos (75 MW). The project is sponsored by Electricité de France, the Italian-Thai Development Public Company Limited and Electricity Generating Public Company of Thailand. The total project cost is estimated to be $1.45 billion, including contingencies, with $450 million of equity financing and $1 billion of debt. The international dollar lenders to the project indicated that without adequate political risk mitigation, they would not be able to support the international lending package. The WBG and ADB cooperated in providing the multilateral guarantees and direct lending needed to bridge the financing gap.

In partnership with GEF and donor countries, the IFC is helping local financial institutions fund RE and EE projects in Eastern and Central Europe, Russia, and China as part of its response to climate change. The IFC program provides a variety of services and financial resources to local banks and companies that invest in new technologies. The program consists of advisory services to banks and borrowers on RE and EE projects; lines of credit and IFC/GEF partial guarantees for local banks and leasing companies; facilitating partnerships between local banks and project developers; standardized transactions for banks and developers. As of June 2006, a $70 million portfolio of RE and EE projects has been funded, including small-scale hydropower, building retrofits to improve their EE, biomass-fired boilers, and EE in schools.

The $108 million in IDA credits to the Indian Renewable Energy Development Agency (IREDA) for RE financing and institutional development support leveraged nearly $200 million in cofinancing from the private sector. The IREDA project contributed to increasing RE share of power generation capacity in India from about 0.1 percent of total generation capacity in 1992 at project initiation to 3 percent by March 2001 at project end.

With additional parallel financing from developers and other commercial financial institutions, nearly 3,000 MW of wind, small hydropower, biomass, and PV power systems were in operation by March 2001, compared to about 100 MW in 1992. By the end of the project IREDA had committed financing of Rs 47 billion to nearly 1,500 projects accounting for 1,720 MW. Subsequently the Bank approved a follow-up project, the Second Renewable Resources Development Project that provides IREDA with financing from an IDA credit and IBRD loan of $130 million to support small hydropower and EE investments that leveraged an additional $170 million from other sources. With additional parallel financing from the private sector, as of March 2006 IREDA had approved 1,783 RE and EE projects, and committed Re 74.5 billion in loans (about $1.5 billion) to support the clean energy capacity of 2,707 MW that annually displaces 1.3 million tons of coal equivalent.

Reflecting Europe's early commitment to RE and European leadership in much of the RE market, the EIB has been actively engaged in financing renewables for more than a decade, both inside and outside the EU. The EIB has nonetheless stepped up its involvement in financing RE projects following recent EU policy initiatives. Lending for RE at the EIB has grown from €524 million in 2006 to €2.05 billion in 2007—an almost fourfold increase (these figures include activities outside the EU). This strong performance follows the inclusion of energy as a corporate priority in November 2006 and the adoption in June 2007 of Clean Energy for Europe—EIB's revised energy lending policy[3] supporting the ambitious energy and carbon targets adopted

3 See http://www.eib.org/attachments/clean_energy_for_europe.pdf.

by the EU in March 2007.[4] The EIB is keeping its performance in this sector under close scrutiny, with a view to upgrading its RE lending targets for 2008–10 as appropriate. The Corporate Operational Plan 2008–2010 has revised the EIB overall energy lending target for 2008 upwards to €6.5 billion (including activities outside the EU). The target has been increased to €7 billion each for 2009 and 2010. The EIB has adopted more selective criteria for the financing of coal-fired plants and encouraging state-of-the-art technology, such as CCS.

New funding instruments are being developed by the EIB to address market needs for project finance for small, onshore wind farms and, increasingly, large-scale, offshore farms. The EIB has also initiated a program of investments in privately managed investment funds as a means to provide equity funding to the renewables sector (principally wind, biomass, and solar generation, as well as biodiesel production). The first transaction under the initiative (a €25 million investment in a Spanish fund as the cornerstone investor) has been closed, and others will follow in the remainder of 2007. Further transactions, with a broader geographic focus, are being actively developed by the EIB in partnership with the private sector.

One of the key objectives of the EBRD's SEI is to promote, support, and invest in the development of RE capacity in the region of operations. The SEI supports legal assistance to establish the basic regulatory framework for RE, technical assistance for RE project scoping and environmental impact assessment, an updated technical assessment of RE potential, and training for local banks and project developers. In 2007, the EBRD invested almost $100 million in RE projects. The EBRD's largest direct investment in a renewable project was an $81 million loan ($30 million of which was syndicated) to finance the construction of nine small hydropower plants along the river Iskar in northern Bulgaria. The EBRD also committed $37.5 million to the regional EnerCap Power Fund I L.P., a 10-year $150 million private equity fund dedicated to developing wind, solar, and biomass energy generation, along with bioethanol and small-scale hydroelectric developments in Central and Southeastern Europe. Financing from other institutional investors, along with that of the EBRD, means that contributions totaled $112.5 million in this first round of funding.

The IDB is working with countries in the Latin America and the Caribbean (LAC) Region of the World Bank to develop strategies for low-carbon energy sources, including assessment of RE potential and appropriate policy frameworks and incentives; as well as financing investments in RE, such as hydropower, geothermal, wind energy, rural electrification, and biofuels. The IDB is working with several countries, including Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Guyana, Honduras, Panama, Paraguay, and Peru, in developing regulatory frameworks to create better scaling-up conditions and to attract private sector investment in these areas.

A landmark study on the state of biofuel development in LAC, "A Blueprint for Green Energy in the Americas," was produced to help establish an informed approach to the development of the biofuels potential, taking into account opportunities for meeting needs for energy and rural development, as well as related social and environmental concerns. The IDB is collaborating with the Roundtable on Sustainable Biofuels (RSB) in incorporating sustainability principles into the development of biofuel projects.

Under the SECCI initiative, the IDB is providing funds to the Fundación Getulio Vargas to develop "blueprints" of biofuels for countries in Central America and the Caribbean. Initial studies are under way in the Dominican Republic, El Salvador, and Haiti, with two additional countries in the region due to be added to this effort. The IDB is also supporting studies in Argentina Colombia, and Paraguay that are designed to identify and exploit potential biofuel opportunities. In Guatemala, the IDB is funding a series of studies that will enable the government to draw up national guidelines for biofuels production to diversify Guatemala's energy mix. In Brazil, three potential projects have been identified; each involving the construction and operation of a greenfield sugar and ethanol mill and the construction of a 35 MW capacity cogeneration plant than will sell the excess energy to the Brazilian electricity grid.

The Bank will also finance several private sector initiatives for ethanol production. Moema in Brazil was the first large IDB private sector bioenergy project, totaling $120 million. Other

4 The Brussels European Council of March 8–9, 2007, adopted an Action Plan for Energy Policy 2007–2009, committing the EU to achieve at least a 20 percent reduction of GHG emissions by 2020 compared to 1990 (30 percent in case of agreed international action), a 20 percent share of renewable energies in overall EU energy consumption by 2020, and an increase in EE in the EU so as to save 20 percent of energy consumption compared to projections by 2020.

pipeline projects for Brazil, estimated at more than $1 billion, will contribute to Brazil's goal of tripling annual ethanol production by 2020.

In addition, in collaboration with the World Bank, the IDB is developing an RE toolkit as an operational guide and sourcebook specifically targeted to LAC. The purpose of the toolkit is to promote the development of RE projects and investments and broaden the portfolio in RE. Examples of the IDB's increased emphasis on RE include a program of rehabilitation of small hydroelectric power plants in Brazil, funding for a privately owned mini-hydroelectric power project in Chile, supporting Carbones del Cerrejon in Colombia to assess the feasibility for the construction of a 10 MW wind energy farm and the potential use of indigenous-grown "Jatropha" to be used in the production of biodiesel to power the mine, and an Integrated Rural Electrification Plan in Honduras to extend coverage to local communities.

Since 2004, the AfDB has been implementing the Financing Energy Services for Small-Scale Energy Users (FINESSE) Africa program, a Dutch government–funded initiative that seeks to increase financing of RE and EE projects by the Bank, through building requisite capacity within the Bank and in the regional member countries (RMCs), updating the Bank's existing energy sector policy, and assisting operations departments in identifying and developing RE and EE projects and project components. The FINESSE program has already resulted in a number of board-approved projects that feature an RE component, such as a rural water supply project using solar water pumps in Madagascar and PV for schools and boarding facilities in Uganda, as well as inclusion of a renewable energy component (PV, hydropower, and grid extension) in an agricultural infrastructure improvement program, also in Uganda.

As part of the FINESSE program, an Africa-wide assessment has been made of the status of RE and EE, with a focus on needed activities to accelerate investment in these areas. This study also proposes priorities for RE technologies for different regions. The current FINESSE program is reaching the end of its current implementation period. As a follow-up to FINESSE, the AfDB is currently developing a broader program on clean energy access and climate adaptation (to be financed through the planned CECAFA. The program is currently in the early stages of development, but is intended to support both public and private sector projects in cleaner use of fossil fuels, RE, EE, carbon financing, and increasing access to energy, as well as promoting climate change and climate adaptation activities.

At the moment, the private sector department of the AfDB has generated a substantial pipeline and portfolio of RE projects, partly as ongoing investments, and partly because of assistance from FINESSE and support from the Danish International Development Agency (DANIDA) technical assistance. Next to a portfolio of approximately $950 million, a pipeline has been developed including 921 MW wind energy projects, 283 MW of small hydropower, 410 MW of cogeneration, 480 MW geothermal and more than 150,000 kl per year of biodiesel projects. At the same time, in collaboration with the United Nations Environment Programme (UNEP), two important projects: (a) development of cogeneration in seven countries (Ethiopia, Kenya, Malawi, Sudan, Swaziland, Tanzania, and Uganda), and (b) development of small and medium hydropower in eight countries (Kenya, Tanzania, Uganda, Zambia, Mozambique, Malawi, Rwanda, and Burundi) were recently launched.

With bolstered support from the broad clean energy mandate of its EEI, the ADB is helping its DMCs to increase the share of RE projects in the energy mix and increase access to electricity and other modern forms of energy following low-carbon path. During the period 2003–07, the ADB invested a $414 million RE component of more than $630 million in approved loans for 7 projects. Lending for RE projects for 2008–10 is expected to surpass $1.5 billion. Close to two-thirds of this pipeline estimate will be invested in hydropower projects in DMCs that include China, India, Lao People's Democratic republic, Nepal, Pakistan, Samoa, and Vietnam. Under a parallel effort, the ADB is cofinancing five private sector equity funds (see box 2) targeted at clean energy investments that include RE projects.

Box 2: ADB Support for Private Equity Funds for Clean Energy Projects

Using up to $100 million in seed capital, the ADB is helping establish five private sector funds with a total target investment of up to $1.2 billion in RE, EE and clean fuels projects in Asia. The ADB believes the success of these funds will help demonstrate the credibility of private equity in the emerging clean energy sector in developing Asia, and mobilize capital to support other private equity funds. The ADB is playing a catalytic role by identifying and supporting fund managers willing to establish clean energy-focused private equity funds.

The funds—MAP Clean Energy Fund, China Environment Fund III, GEF South Asia Clean Energy Fund, Asia Clean Energy Fund, and China Clean Energy Capital—will each receive up to $20 million in capital from the ADB. The five funds were selected from 19 fund managers responding to the ADB's call for proposals issued in July 2007.

By 2030, global energy demand will likely rise 53 percent from current levels, and developing Asia represents a large portion of it. The energy investment in Asia is strongly carbon-intensive, or highly dependent on coal-fired power generation. The ADB believes that significant resources need to be invested into clean energy and low-carbon investment alternatives over the next few decades.

The MAP Clean Energy Fund (MAP) has the largest target size of the five funds, aiming to invest a total of $400 million in 10 to 15 projects across Asia, with a focus on Indonesia and Southeast Asia. Project investments will range from $15 million to $40 million. Geothermal projects in Indonesia, wind projects in India and Pakistan, and bio-ethanol projects with no competition for food crops in the region are among those considered.

The China Environment Fund III (CEF III) has a target size of $200 million to $250 million and will invest in companies working to improve the environment by reducing, reusing, and recycling natural resources in China. The Fund will make 15 to 20 investments of $5 million to $30 million each in a broad range of clean energy sectors. Among projects in the pipeline are PV modules, large-capacity batteries for wind farms, a laser-based monitoring system for clean coal-fired power plants, thermal technologies, coalbed methane projects, and electronic control system for wind power, biogas projects, and EE projects.

GEF South Asia Clean Energy Fund (GEF-SA) has a target size of $200 million, and will make around 12 investments of $3 million to $15 million each across South Asia in companies and projects that promote the use of efficient, reliable, and cleaner forms of energy in Bangladesh, India, Nepal, Pakistan, and Sri Lanka. The Fund is jointly sponsored by Global Environment Fund, an international private equity firm with an 18-year record of investing in clean technology and emerging markets, and YES BANK Limited, an India-based private sector bank specializing in RE and clean technologies.

The Asia Clean Energy Fund (ACE) has a target size of $200 million and will make about 15 investments of $10 million to $15 million each throughout Asia. Projects in the pipeline in Southeast Asia include palm oil projects, solar project expansions, and replacement of used transformers. Additionally, it will also be involved in a PV business in Indonesia, a waste-to-energy project, biodiesel companies in the Republic of Korea, and a power plant rehabilitation project with a focus on China and India.

The China Clean Energy Capital (CCEC) fund has a target size of $100 million to $150 million, and will make 8 to 12 investments of $5 million to $30 million each in RE projects, energy savings and EE, and other clean energy technologies in China. CCEC's pipeline includes renewable power generation projects/technologies (biomass, wind farm, solar thermal), alternative fuels (biodiesel, straw-to-ethanol), and energy savings and EE technologies (new construction materials) in China.

Decreasing Carbon Emissions from Power Plants and Oil and Gas Facilities

The MDBs are also pursuing investment and analytical support designed to decrease emissions from thermal energy sources. A number of interventions are being pursued, including thermal power plant rehabilitation, transmission and distribution network efficiency improvements, upgrading of efficiency of new thermal power plants, early retirement and replacement of inefficient plants with state-of-the-art facilities, support for consideration and possible future implementation of CCS, gas flaring reduction, and methane release reduction.

The EIB has introduced revised criteria for financing new commercial coal and lignite power stations. In order to avoid a shift toward carbon intensive electricity generation, new plants should replace existing coal and lignite power stations while providing a decrease of at least 20 percent in carbon intensity. In addition, such plants may be financed only when they use the best available technology and are "carbon capture ready" (that is, when they are able to exploit CCS once that technology becomes commercially available), and are cost-effective, taking into account CO_2 externalities. The EIB has also established some specific criteria for financing the rehabilitation of existing coal-fired power stations.

The ADB is currently developing a new energy strategy. This strategy will encourage DMCs to adopt available, cleaner thermal-power technologies. In this connection, the ADB is assisting DMCs in collaborating with developed countries for transfer of new and better technologies that can move from the development stage to deployment stage. Examples include the Bangladesh Sector Development operation, highlighted above, which also includes two-generation units fired with natural gas and components designed to improve generation efficiencies in an upcoming Philippine, India, and Pakistan operations.

The EBRD is already implementing power plant rehabilitation projects such as the one described in box 3. An example is the $209 million committed in 2007 to TGK-9, one of Russia's Territorial Generating Companies formed in the process of unbundling the state-controlled monopoly Bank's to upgrade its power stations. The company supplies power to the northern Urals and the Komi Republic, resource-rich regions that have experienced strong economic growth in recent years. The power system is operating close to full capacity and the investment will enable the company to finance improvements that will result in a 66 per cent increase in electricity production and a 10 per cent increase in heating provision. The EBRD's SEI also supports studies to recommend rehabilitation and refurbishment or fuel-switching strategies at large thermal power plants, to evaluate the potential of "clean coal technologies" for EBRD countries of operations, and to review opportunities for, and barriers to, projects that reduce gas flaring. In 2007, the Bank lent $30 million to Pavlodar Energo JSC in Kazakhstan, a utility group comprising power and heat generation with 550MW total installed capacity and distribution network. Pavlodar Energo's upgrade of a combined heat and power (CHP) plan will improve efficiency and address growing demand in the Pavlodar region. Kazakhstan's rapid growth and increased policy focus on energy security and EE are likely to present the Bank with further climate change mitigation investment opportunities in future. Given the high level of energy consumption of the large district heating networks in

Box 3: Azdres Power Project in Azerbaijan, 2006

The EBRD provided a $115 million sovereign guaranteed loan to fund the rehabilitation of Azerbaijan's largest thermal power plant, with 2,640 MW nameplate capacity. The project will restore plant efficiency, availability, and capacity with an extensive refurbishment of seven out of eight units onsite, together with the repair and modernization of the flue gas chimney and cooling water tunnel. The plant, based in Mingechaur, provides more than 40 percent of Azeri generation capacity, but operates significantly below technical capacity, because of growing inefficiencies The project could save more than 8 million tons of CO_2 per year and is seeking qualification under the Clean Development Mechanism (CDM). In conjunction with the loan, the EBRD has sourced technical assistance to support regulatory reform in the power sector.

the cities of its countries of operations, the EBRD has also placed a particular emphasis in the context of the SEI to increase the EE of district heating operations.

In 2007, the EU adopted the European Technology Platform for Zero-Emission Fossil Fuels Power Plant (Zero Emissions Technology Platform, ZETP) and started working on the design of a mechanism to stimulate the construction and operation by 2015 of up to 12 large-scale demonstration CCS plants. The EIB is actively considering measures to finance such CCS demonstration plants and prototypes for other experimental clean coal technologies as Research, Development and Innovation projects on a case-by-case basis. It is intended that China and/or India should host at least one such flagship plant. The EIB is working with the European Commission and the ZETP, with particular regard to the development of appropriate financial support mechanisms for the flagship program. Given total costs, which could be on the order of $10 billion, there will inevitably be significant recourse to market-based financial mechanisms.

The World Bank's Global Gas Flaring Reduction Partnership (GGFR) Phase II 2007–09 focuses on high-impact flaring countries and regions such as Russia, the Middle East, and the Gulf of Guinea. Gas flaring reduction projects under preparation include the Danilovsk gas-to-power JI project in Russia and the AFAM gas–to–power project in Nigeria. The Medco Kaji gas-to-liquefied petroleum gas (LPG) demonstration project in Indonesia is undergoing validation. Brazil's Petrobras, in collaboration with GGFR, agreed to explore gas flaring reduction opportunities. Identification of additional gas flaring reduction and gas utilization projects that leverage carbon finance, continue to take place with three new projects identified in Ecuador. A new methodology for a Clean Development Mechanism (CDM) has been developed for the Nigeria project and is currently under evaluation. If successful, it has the potential to open up significant carbon finance opportunities in that country. The IDB is also in the process of identifying a gas flaring reduction project though a technical assistance grant in Ecuador.

The Clean Energy and Development Investment Framework of the AfDB emphasizes increased use of gas for power production and clean coal power generation. Good examples of opportunities to increase use of gas in power production are the West African Gas Pipeline project and the Nigeria Liquefied Natural Gas projects cofinanced by the World Bank. The latter enables gas produced as a byproduct of Nigerian oil production to be exported to Ghana, Togo, and Benin.

Methane Capture

Methane capture as part of solid waste management programs offers one of the most financially attractive climate change mitigation options. Methane capture option has the potential to be rapidly mainstreamed in the urban strategies for developing countries as shown in box 4.

The MDBs have initiated programs to provide analytic support for landfill methane capture programs. For example, the World Bank ESMAP program is supporting a two-phased landfill gas initiative in its Latin American and Caribbean Region (LAC). The first phase aims to assist LAC client countries to better understand the best-practice business models and institutional arrangements for development of nonconventional energy sources at large city landfills in the LAC region by means of landfill gas recovery and utilization systems. This would be accomplished through documentation and dissemination of best practices and sound technical guidance. Discussions with the task teams of the two LAC pilot landfill gas–to–energy projects, which still have to be implemented, indicate that there is a lack of already-compiled, easily accessible knowledge about this subject. The second phase aims to identify potential new projects that could form the basis of a regional Bank program and carry out pre-investment work at each site. The EIB is focusing on similar landfill as well as wastewater treatment investments, particularly in the Southern Mediterranean region. The WBG is also involved in systems focused on reducing methane emissions from sludge and animal waste. The IFC has invested in Animal Waste Management Systems (AWMS) in Brazil and Mexico that capture and dispose of methane produced by biological decomposition of animal waste.[5] The World Bank's

5 http://www.ifc.org/ifcext/enviro.nsf/Content/OurStories_CarbonFinance_AgCert
http://ifcln001.worldbank.org/ifcext/pressroom/ifcpressroom.nsf/PressRelease?openform&DE2C308A50202B0A8525704B0052146B

Box 4: Tunisia Municipal Solid Waste Management

This $27 million IBRD-financed project assists the Tunisian government in developing the key elements of environmentally and financially sustainable municipal solid waste management. The project includes assistance to improved solid waste management at the national and local levels and rehabilitation of environmentally harmful dumpsites into modern landfills with biogas collection and utilization capacity. These actions will enable the Tunisian government to access additional revenue through the CDM, thus improving cost recovery for the solid waste management sector. Institutional support and capacity building will support the establishment of national coordination of the solid waste management sector plus a decentralized municipal solid waste management system at the regional and intermunicipal level focused on introducing modern solid waste management, as well as measures to achieve cost optimization and cost recovery.

The project will finance construction of a fifth cell in the Djebel Chekir landfill (the largest landfill in Tunisia) including the construction and operation of a biogas management system, and nine new landfills designed along the principles of sustainable management of municipal solid waste in Bizerte, Nabeul, Sousse, Monastir, Kairouan, Sfax, Gabes, Jerba, and Medinine.

Project outcomes include institutional strengthening of the sector, policy instruments for sustainable waste management, introduction of a national cost recovery system, outreach and communication to change citizens' behaviors, and incremental revenue generation from reductions in GHG emissions.

carbon funds have supported projects to reduce methane and nitrous oxide in urban wastewater treatment.

The IDB has developed a series of assessments of opportunities for landfill gas capture and energy generation potential, including an evaluation of waste disposal systems and landfill conditions in Central America, and initial assessments of carbon potential in specific landfill sites in the region. As a result of these assessments, the Bank is now assisting countries in the preparation of methane capture projects for financing under the CDM. The Bank also commissioned an economic assessment of methane capture and its use for energy generation, taking a wide sample of landfills across the region. This information was used as input for the development of a screening tool that is helping project sponsors in the region and project teams in the Bank carry out preliminary assessments of carbon potential in landfills. The IDB is also engaging resources in developing landfill gas–to–energy projects with CDM components for a number of cities in Latin America.

The ADB has also supported several coalmine methane extraction and utilization projects in China. One of them is the Fuxin Coalmine Methane Utilization Project in Liaoning Province. It has improved safety conditions in the community and supplies methane to residents and nearby industries. It was seen as a viable carbon investment opportunity and through the ADB's credit marketing facility, attracted strong interest from buyers. The ADB has also supported numerous landfill gas projects, as well as methane capture and utilization projects in agricultural waste. In another example, the ADB recently approved a technical assistance (TA) project for the development of biomass power generation in rural areas in China. The ADB and the World Bank are active members of the Methane to Markets Partnership promoted by the U.S. Environmental Protection Agency.

Improved water management is gaining increasing importance within and outside Europe partly reinforced by the climate change problem. The EIB is reviewing its lending policy in the water sector with the aim to establish adaptation as an area of intervention alongside mitigation. Among the others, this will include (a) requesting promoters to consider cost effective adaptation and mitigation measures at master planning and infrastructure design stages; (b) using existing TA mechanisms to support promoters to carry out integrated and comprehensive climate change risk assessments; (c) promoting EE in the water sector; (d) seeking to capture and

reduce methane and other GHGs emissions from biological water treatment plants and support their use as alternative energy sources. Sound solid waste management is crucial for the sustainability of economic growth, as it results in both the reduction of GHG emissions and the recovery of secondary raw material and the generation of energy. Recently, the EIB has accorded solid waste management projects higher priority status in its Corporate Operational Plan. The quantity of solid waste generated in Europe is increasing, and by the year 2020 one projection is that some 45 percent more solid waste will be generated in the EU than in 1995. According to EU GHG targets on the other hand, net emissions must fall, an aim that will be supported among the others via an increase in the capacity of recycling centers. EIB's work in the New Member States, which is in part carried out through the JASPERS program, will help achieve EU GHG emission reduction targets and in some cases also lead to power and heat generation from a partly RE source.

Reducing Carbon Emissions in Transport

Estimates indicate that the transport sector contributes about 14 percent of global emissions, making this a key sector for climate change interventions. In 2002 the transport sector accounted for 21 percent of worldwide energy consumption and is projected to generate more than 60 percent of the increase in total energy use through 2025. The strong connection between economic growth and transport-generated GHGs can be moderated over time by changes in travel behavior, logistics decisions, technology choices, and transport modes. These factors can, in turn, be influenced by planning, fiscal, and regulatory measures, as well as through public investments in infrastructure. The MDBs are currently reviewing their transport strategies and programs with a view to making them more climate friendly.

The ADB is addressing the transport sector's changing environment through its Sustainable Transport Initiative, an approach to realign sector interventions and place them on a more sustainable footing to mitigate the negative externalities of climate change contribution, local air quality, energy use and safety, while supporting continued and sustainable economic development. In 2006, the ADB prepared a report on "Energy Efficiency and Climate Change Considerations for On-road Transport," which presents one of the first comprehensive efforts to analyze the relationship between the transport sector and climate change in Asia. The study concludes that a paradigm shift, resulting in a new Asian consensus on economic development mobility, will be required to guide policy making and investment decisions in urban development and transport. To accomplish the vision, the study recommends a number of policy interventions to improve EE in transport (box 5). The work set clear guidance on priority areas, including (a) integrated urban reform, land use and transport planning, (b) promoting energy efficient modes of transport, (c) improving vehicle engines and fuel technology, and (d) fiscal measures to influence travel behavior patterns.

In 2007 a regional TA study examined 5 cities (Dhaka, Colombo, Kathmandu, Harbin and Changzhou) to explore where urban transport policy, planning, infrastructure and service provisions were failing to meet the growing and changing demands of urban travel. The findings provided objective analysis of city capacities, institutional structures and financial resources to address these emerging challenges. In 2008, a follow-on study is preparing a strategic development framework for enhanced engagement with cities, building on previous city case studies and ADB urban transport operations. The work will define a new approach for urban transport development and 'rules of engagement' for sustainable transport solutions and services including clear criteria on types of support and interventions. Complementing these studies are three related activities being undertaken in 2008, all directly related to the transport sector and climate change. The first is a data collection and forecasting exercise to assess the magnitude of GHG contributions from all modes of transport, namely, air, water, road, and rail. The work output will provide important baseline information and future growth trend scenarios as an integral part of the wider ADB activities to monitor and address climate change. The second piece of work will assess the applicability of European models incorporating "visioning and back casting techniques" for GHG emission targets and associated reduction policies to Asian DMCs. The third piece of work will explore the role that biofuels can play in transport sector GHG mitigation.

Asia's rapid urbanization is one of the defining trends in its recent development history, but the growth of most cities has outpaced the ability of urban planners to direct the development process so that cities remain livable and efficient from the standpoint of their energy use and the mobility of their residents. Based on recommendations from the recently completed Managing Asian Cities study and reviews of its Urban Strategy, the ADB has initiated programs to improve its understanding of how best to reduce GHG emissions in Asia's cities while accommodating their continued growth (as well as their adaptation to climate change; see below). Programs also have been initiated to support development of related investments. Urban GHG emissions are derived from transport, residential and commercial buildings, industry, and waste management.

Box 5: Principal Policy Interventions to Reduce GHG Emissions

- Integrate urban reform, land use planning, and transport planning.
- Adopt integrated transportation systems to promote energy-efficient modes of transport.
- Improve vehicle engines and fuel technology.
- Use fiscal measures to influence travel behavior patterns.

Many investments to mitigate GHG emissions from these sources also offer strong potential for so-called co-benefits—generating other environmental and social gains through reduced local air pollution, traffic congestion and better waste management, among others.

The ADB has been continuously involved in the integration of air quality management and sustainable transport into the economic and social strategies, policies, programs, and projects of its DMCs. Clean Air Initiative for Asian Cities (CAI-Asia), established in 2001 with support from the ADB, has taken the sustainable urban

Box 6: Sustainable Urban Mobility in Asia

The Sustainable Urban Mobility in Asia (SUMA) program focuses on improving urban air quality, improving road safety, and reducing transport's contribution to climate change. This will be accomplished primarily through assistance to Asian countries and cities in strengthening the formulation and implementation of sustainable transport policies and projects.

The SUMA program, funded by the Swedish International Development Cooperation Agency (SIDA), is being implemented by the ADB through the Clean Air Initiative for Asian Cities (CAI-Asia) and in partnership with other leading international organizations promoting sustainable urban transport. Activities being undertaken in SUMA include (a) a study on motorized two- and three-wheelers in Asia and how these modes can be better integrated in the urban traffic systems; (b) assisting the city of Ahmedabad, India, to develop a Bus Rapid Transit (BRT) operations and business plan; (c) how cycling and non-motorized transport can be integrated into urban and transportation planning of cities; (d) a capacity-building program to develop future trainers on a range of topics such as mass rapid transit options, non-motorized transport planning, transportation demand management, and financing sustainable urban transport; (e) develop a national framework and action plan for the Philippines on environmentally sustainable transportation; (f) environmental impacts of electric bikes in China; and (g) the development of social impact assessment guidelines that can be used for urban transportation projects.

transport agenda forward with the Partnership for Sustainable Urban Transport in Asia (PSUTA) program and the SUMA program (see box 6). The Partnership for Sustainable Urban Transport in Asia project undertook case studies to examine transport impacts on pollution, congestion, and safety in Hanoi, Pune, and Xian.

As part of its effort to mitigate the impacts of climate change on the transport sector the ADB has increased lending for railway sector. It will maintain its presence in the road sector, but will develop a broader portfolio, including urban public transport, railways, water transport, and traffic management including innovative financing options to promote energy efficient transport modes, especially in urban areas. Several sustainable transport projects are being developed, which include traffic management and integrated public transport (bus rapid transit, BRT, and light rail transit, LRT) components; urban rail projects with innovative and sustainable financing solutions to improve financial viability; railway projects with components to enhance EE; and integrated transport projects with intermodal solutions. The ADB is also assisting in preparing the Energy Efficiency Strategy for road and railway sector in the member countries.

In May 2008 the World Bank Group issued a new Transport Business Strategy for 2008–12 entitled Safe, Clean and Affordable Transport for Development. Among its strategic objectives, it addresses the sector's contribution to climate change, with a view to both mitigating the impact of transport operations and adapting transport infrastructure to take into account climate change effects. Interventions will include (a) restraining transport energy consumption, (b) assessing and controlling transport emissions, (c) promoting shifts to low-carbon modes, and (d) establishing guidelines for environmentally effective transport planning and decision making. Several new projects designed to reduce CO_2 emissions in transport have been initiated, for example, the KSRTC Bus Biofuel and Maintenance Program for India will support engine tuning and tire replacement, replacements of water induction kits, and the introduction of biofuels. The Trans Santiago Urban Transport Modernization Plan will support the introduction of low-emission buses—compressed natural gas, hybrid, or electric engine technologies. A recent World Bank study on Bangladesh inland waterways shows the benefits of expanding inland waterways as a transport mode with low energy intensity. Rates for bulk freight for water transport are a fourth of the rates for road transport. Connectivity of parts of the rural population depends on services provided by operators of river transport. The installation of proposed new gearboxes in boats used in rural areas, being supported by the Bank, could decrease fuel consumption by 30 per cent, increasing the EE and the affordability of transport services by the poor. Finally, a study on the China Emission Intensities of Large-Scale Road and Rail Projects is expected to be completed shortly and a report on Carbon Finance and Urban Transport in India report is currently being prepared.

The EBRD is developing investment opportunities to reduce municipal infrastructure emissions with a particular focus on urban transport. The SEI supports feasibility studies and institutional strengthening (with special attention to tariff reform and measures to improve affordability), and assistance to develop land use–mobility policies and/or sustainable transport strategies in various cities of the region. The EBRD investments in that area almost doubled in 2007 compared to the year before. There is a major opportunity to build upon the significant public transport networks existing in most Eastern European cities to reduce the carbon emissions related to urban transportation.

The AfDB will focus on transport systems improvement, including the selective support of mass rapid transport (MRT) investments, including low-emission bus rapid transit networks and high-speed electric-powered light rail networks, especially in mega cities such as Addis Ababa, Cairo, Johannesburg, Lagos, Kinshasa, and Nairobi. Mass transit combined with adequate road pricing and non-motorized, transport-friendly urban planning will reduce traffic congestion and contribute to more effective vehicle and traffic maintenance and policing.

The IDB has been expanding its support of BRT systems, with more than 10 operations in nine countries. The bank is preparing an additional eight BRT operations. The bank has engaged resources for the assessment of carbon reduction potential and CDM opportunities in urban transport. The IDB has also financing efforts to address key methodological challenges in build-

ing up CDM projects in urban transport (focusing on baseline development and additionality), and is now identifying carbon finance opportunities in urban transport projects in a number of midsize cities in LAC.

In mid-2007, the EIB adopted a renewed transport lending policy partly as a response to EU new targets with respect to climate change. The renewed transport lending policy puts a clear emphasis on environmentally friendly modes of transport, such as railways, inland waterways and maritime projects, since these are intrinsically the most promising in terms of reducing GHG emissions per transport unit. More rigorous climate change considerations will also be more consistently applied to urban transport and intermodal hubs. Further emphasis will be given to Research, Development and Innovation activities, including engine and fuel technologies, which improve EE and reduce emissions. More generally, the Bank will seek to assess the impact of its transport projects on GHG emissions.

Reducing Emissions through Reforestation and Avoided Deforestation

Reduced emissions through reforestation and avoided deforestation (REDD) are particularly important opportunities for mitigating GHGs in developing countries. Emissions from deforestation and land use changes are estimated to account for more than a third of total emissions each year from developing countries. Using carbon markets to provide long-term incentives for curbing deforestation is widely cited as an attractive option. Progress on reducing deforestation will have both mitigation and adaptive value for developing countries.

The World Bank's BioCarbon Fund was set up in 2004 to deliver cost-effective emission reductions through carbon sequestration, while promoting biodiversity conservation and poverty alleviation. The fund is composed of two tranches: Tranche 1 started operations in May 2004, has a total capital of $53.8 million, and is closed to further participation. Tranche 2 became operational in March 2007. Tranches 1 and 2 are mainly supporting afforestation and reforestation projects eligible under the Kyoto Protocol; however, they also support pilot projects that avoid deforestation, currently not Kyoto compliant.

In the area of avoided deforestation, the World Bank has been working closely with donor and developing countries, international organizations, and the private sector and indigenous people and forest dwellers to design the Forest Carbon Partnership Facility (FCPF). The FCPF aims to assist IDA and IBRD member countries in their efforts in REDD and, in piloting new mechanisms (both market and nonmarket) for countries to avoid deforestation and degradation, which are not currently addressed through the carbon market.

The FCPF will comprise a Readiness Mechanism and a Carbon Finance Mechanism. The Readiness Mechanism will help more than 20 developing countries build their capacity to participate in future REDD incentive systems, by supporting design and implementation of measurement and reporting systems, development of national reference scenarios for REDD, and development and adoption of national REDD Strategies reflecting national priorities and constraints. The Carbon Finance Mechanism will offer positive incentives for reducing emissions from tropical forests, which can improve the livelihoods of poor people who depend on these natural resources, while also protecting natural assets. Ultimately, the FCPF seeks to foster new and additional financing for forest protection and sustainable forest management.

The FCPF has been approved by the World Bank Board and 34 developing countries have expressed their interest in participating. A number of existing programs are also providing support to REDD activities, such as the Proposals Program on Forests and Forest Law Enforcement and Governance (FLEG). In addition, regional programs such as the Pilot Program/G7 in Brazil are intended to develop capacity for successful implementation of any program that would compensate developing countries for reducing emissions from deforestation.

Under Tranche 2 of the BioCarbon Fund, the World Bank has initiated analytical work on how to develop CDM-eligible programs for conserving soil carbon in agricultural areas and rangelands. A pilot operation is being planned to be undertaken in SSA. Agricultural wastes—from crop residues and from liquid and solid waste from livestock and industrial food production—are a significant source of GHG emissions. The Bank is supporting a broad range of projects to utilize such wastes

while reducing GHG emissions, such as the use of rice husks and sugarcane bagasse for energy generation. Several related projects were prepared and contracted in fiscal 2007 under the WBG-administered carbon funds, including a demonstration in Nepal that carbon finance revenues can completely guarantee finance for biodigesters at farm level through programs implemented at the national level.

In June 2007 the IDB organized a regional workshop on technical and scientific aspects of avoided deforestation relevant to LAC. The purpose was to gather policy makers, scientists, and NGOs from the region to enhance the understanding of the benefits of and opportunities for reducing emissions from deforestation and degradation in LAC. As a follow-up, the Bank is preparing technical assistance for countries to support the development of methodologies and capacity building on a pilot basis that will enable the use of carbon financing for lowering GHG emissions related to avoided or reduced deforestation.

The ADB is initiating work on REDD in Southeast Asia under its Greater Mekong Subregion Core Environment Program and a planned rainforest conservation activity in Borneo. Under the Greater Mekong Subregion program, the Biodiversity Corridors Initiative is testing conservation approaches on lands outside of formal protected areas, including options for the use of carbon finance to encourage forest protection and land use practices to reduce GHG emissions, provide local livelihoods, and conserve biodiversity. In Borneo, the ADB is working with government agencies and NGOs to develop and implement plans for conservation of remaining upland forests, including the potential application of REDD approaches attracting carbon financing.

In addition to its forestry portfolio the AfDB is in the process of establishing the Special Fund for the Congo Basin Forest Ecosystems with initial financing of about $100 million to slow the rate of deforestation by developing the capacity of communities and institutions in the Congo Basin countries to manage their forests and develop livelihoods that are consistent with forest conservation objectives.

The EIB has is actively considering possible ways in which it could intervene in this complex sector. It has contributed financially to a small but growing number of forestation and reforestation schemes. It is following the World Bank–led work on an FCPF, and has initiated, with a group of European private sector entities, a joint review of the market opportunity for an ecoystems fund.

Relative to the importance of land use change and deforestation for global GHG emissions, the MDBs' efforts in this area are still modest. However, they are committed to raise the priority of this subsector and to develop a set of appropriate interventions.

New Financial Instruments and Methodologies for Carbon Finance

All the MDBs have embarked on efforts to catalyze low-carbon investments through the mobilization of funding that can promote innovation and help fund the incremental costs of these projects. These efforts include innovative financial products and support for the further development of the carbon market.

The WBG since 2000 has pioneered the carbon market and contributed to its emergence, evolution, and growth by managing a number of carbon funds and facilities, today reaching more than $2 billion in value. Based on this experience, the WBG continues to facilitate the expansion of the carbon market by acting as trustee for carbon funds and facilities, developing new methodologies, and testing new approaches to structuring and financing carbon asset creation. Most of these funds and facilities provide incremental revenue to low-carbon investments, and provide only limited upfront financing for the investments themselves. The carbon purchase contracts, however, are structured to enable project sponsors to borrow against them.

The WBG's long-term productive partnership with the GEF has been a major force in advancing the climate change agenda. GEF grant funding focuses on global environmental benefits and is available for piloting and innovating new approaches, as well as creating enabling environments for market transformation by removing barriers, capacity building, and institutional development. GEF resources have been often combined with IDA, IBRD, and IFC products, which allowed strengthening of climate change objectives in WBG lending. In particular, the GEF's shift from project-by-project to programmatic actions is helping countries take a broader and longer term view in addressing

barriers and strengthening national capabilities to understand and tackle both mitigation and, more recently, adaptation challenges. GEF has played a critically important role in developing a knowledge base for adaptation. At the Conference of Parties (COP13) in December 2007, the governance and management arrangements for the new Adaptation Fund were agreed, with GEF acting as the secretariat.

Two important new facilities have recently been approved by the World Bank's Board. The first, the Carbon Partnership Facility (CPF), will provide funds for carbon asset development and purchase emission reductions well beyond the current commitment period of the Kyoto Protocol , emphasizing programmatic and sector-based approaches that would deliver significantly larger reductions in GHG emissions and promote lower-carbon development paths in developing and transition economies. The CPF governance structure is aimed at bringing together both the buyers and sellers of carbon assets in a partnership. Furthermore, the new facility is expected to contribute to continuity in the carbon market while international negotiations of a post-2012 regime continue under the UNFCCC and to provide practical experiences that could assist regulators in developing a legal, regulatory, and institutional framework for GHG mitigation efforts.

The second new facility, the FCPF, aims to assist IDA and IBRD member countries in their efforts to reduce emissions from deforestation and degradation. The FCPF will work to develop mechanisms (both market and nonmarket) to provide incentives to avoid deforestation and degradation, which are not currently addressed through the carbon market. The FCPF will include significant resources through a Readiness Mechanism for capacity building and technical assistance, as well as a fund for piloting incentives and the purchase of carbon assets. Other innovative approaches the Bank is developing in cooperation with its client countries include green investment schemes in Central and Eastern European countries, which will channel the revenues from emissions trading to further emission-reducing activities and development of mechanisms to improve carbon price discovery through the use, for example, of auctions of emission reduction credits.

The IFC has recently closed out its two carbon facilities that it has managed since 2002 for Dutch government and has committed $135 million in 12 transactions to purchase credits from more than 40 projects. The IFC also recently launched a new product for the carbon market, the Carbon Delivery Guarantee, that provides transparent connectivity between the primary and secondary markets, and guarantees delivery of carbon credits from projects in developing countries to companies and financial institutions in industrialized countries, thereby enhancing the value for sellers while eliminating project delivery risk for buyers. Two deals were recently announced two projects to which it is providing the Carbon Delivery Guarantee for a total of 1.7 million Certified Emission Reductions (CERs) and expects to significantly ramp up over the next 2–3 years.

The EBRD is working with two Carbon Credit Funds: the EBRD/EIB MCCF and the Netherlands Emissions Reduction Cooperation Fund (NERCoF). The EBRD together with the EIB established the MCCF as an instrument in their strat¬egy for addressing climate change. The MCCF is one of the few carbon funds dedicated specifically to countries from Central Europe to Cen¬tral Asia now accounting for €190 million ($285 million). It purchases carbon credits from projects financed by the EIB and/or the EBRD and can provide up to 50 percent of carbon finance upfront under certain circumstances. It also has a €40 m window for green investment schemes. The Government of the Netherlands and the EBRD created together one of Europe's first carbon funds, which closed for further investments on 1 December 2007. Through this fund carbon credits from EBRD projects were purchased for the account of the Netherlands government for compliance with its 6 per cent emission reduction commitment under the Kyoto Protocol. This is done using the Joint Implementation (JI) mechanism of the Kyoto Protocol. NERCoF results to date include the signing of 4 projects in 2007 for an aggregate of 2.1 million Carbon Credits and total contract amount of about $22 million. The delivery period has started for a portfolio of 7 projects reflecting an expected reduction of 3.5 million tons of CO_2 equivalent during the Kyoto Protocol commitment period (2008–12).

The EIB has significantly raised its profile in the carbon sector, with three funds operational as of mid-2007, all in partnership with other MDBs, and each targeting a niche in the market. The

first of these is the above-mentioned €190 million MCCF with the EBRD, the second was the €50 million Carbon Fund for Europe with the World Bank, and the third was the €100 million EIB–Kreditanstalt für Wiederaufbau (KfW) Carbon Programme. In addition, a Facility for Energy Sustainability and Security of Supply (ESF) was approved in 2007, which enables the EIB to commit up to €3 billion outside the EU, from its own resources, for projects in developing countries on top of the 2007–13 external lending mandates. This facility aims to promote environmentally sustainable, cleaner energy growth paths by promoting the transfer of clean technologies between the EU and developing countries. A first operation under this facility was signed in November 2007 to establish the China Climate Change Framework Facility (€500 million), and others are under preparation.

The Carbon Market Initiative (CMI) is one of the ADB's new initiatives under its Clean Energy and Environment Program that support the development of clean energy, EE, and other GHG abatement projects in those developing countries in Asia and the Pacific that are eligible under the CDM of the Kyoto Protocol. Most of the existing carbon procurement funds provide payment only upon project completion and when the carbon credits are delivered. As a result, many clean energy projects face a critical upfront financing gap that prevents them from being undertaken in the first place. The ADB proposes to address these barriers through a dedicated comprehensive and integrated CMI. It has three components:

- The Asia Pacific Carbon Fund (APCF), a trust fund of $151 million, provides upfront cofinancing for 25–50 percent of future carbon credits from CDM projects in its DMCs.
- The Technical Support Facility provides comprehensive technical support to project sponsors to develop CDM-eligible projects.
- The Credit Marketing Facility provides marketing support services to project sponsors in obtaining optimal prices and sale terms for CERs not purchased by the APCF in the open market.

To date, 41 projects have been identified in 16 DMCs and are currently being processed for technical support and cofinancing by the CMI. The unique combination of ADB-underlying finance, upfront carbon finance, and comprehensive technical assistance aims to boost the number of projects that can contribute to climate change mitigation.

In May 2008, the ADB established a Climate Change Fund, with an initial contribution from the ADB's Ordinary Capital Resources (OCR) 2007 net income, to address climate change through technical assistance, investment components for both private and public sector projects, and other forms of cooperation that may be agreed upon with other development partners. The fund aims to support knowledge products, as well as business and/or financial advisory and engineering services to (a) undertake economic and sector work linking climate change to sustained growth and related areas; (b) prepare projects, transactions, and programs to investment; (c) share costs in implementing climate change investment programs in combination with other government, donor, and commercial funding; (d) support cooperation relating to science and technology for facilitating transfer of technology, knowledge, and experience; and (e) build the capacity of market actors in the context of implementing climate change investments and programs.

The IDB is working with public and private sector clients in the region to increase the number of projects eligible for carbon financing and to facilitate access of the LAC region to international carbon markets. In addition to financing the underlying projects, IDB efforts are focused on reducing transaction costs related to low-carbon projects (carrying out prefeasibility and feasibility studies; supporting the preparation of project documentation related to the CDM project, including development of methodology; assisting in the marketing of CERs; promoting programmatic and sector approaches to scale up the low-carbon impacts; and lowering risks for project development and delivery). The IDB also is working with local financial entities to increase domestic and international financial flows and investment in low-carbon projects in the LAC region by setting up lines of credits, providing guarantees to loans granted by local banks, and fostering equity investment in clean energy funds oriented to identify and develop small and medium low-carbon projects in the region. Some specific examples of SECCI support for carbon finance include the development of a CDM methodology to generate CERs associated with a new

IDB-supported metropolitan train line in São Paulo; support for a Brazilian water and sanitation utility in the evaluation of the Carbon Finance potential for the capture of methane from sludge in the context of an investment program financed by the IDB; support for CF programs involving national trust funds (FOMECAR) and development banks (NAFIN, BANOBRAS) in Mexico; and contributions to the development of a methodology for assessing carbon credits associated with an EE program for housing (presented to the UNFCCC for approval) in Chile.

Box 7: The Nairobi Framework

In November 2006, the Nairobi Framework was established as an interagency capacity-building mechanism focusing on developing the carbon market in Africa. Partner agencies in this framework are the World Bank, UNDP, UNEP, AfDB, and UNFCCC. The framework builds on the work already being done by the U.N. agencies, including the Bank's Carbon Finance Assist (CF-Assist), and aims at substantially scaling up the participation of Africa in the carbon market through improved coordination among the partner agencies and increased funding by donors.

As an initial activity, the partners have conducted a mapping exercise to identify potential overlaps in the current work and opportunities for sharing and complementing each other's programs. The World Bank also has undertaken an Africa-wide assessment of potential for carbon mitigation projects, based on available secondary information. In meetings organized around the Subsidiary Body for Scientific and Technological Advice (SBSTA) in May 2007, the partners have also agreed upon a number of coordination measures for sharing and enriching the capacity-building activities.

As part of the market development activities in Africa, the World Bank has launched project identification and preparation activities in 16 countries, and signed several emission reduction purchase agreements, especially by the Community Development Carbon Fund. Notable projects in this regard are the 85 MW geothermal project in Kenya and the municipal solid waste project in Durban.

Capacity-building programs under the CF-Assist have been launched in nine African countries, with a principal focus on CDM project portfolio development and institutional strengthening. As part of this effort, the World Bank supported 23 host countries from Africa to participate in the Carbon Expo, the premier event for the carbon market, and provided them with an opportunity to conduct project transactions with carbon buyers from Europe and Japan. The World Bank also cosponsored a Carbon Finance Investment Forum in South Africa in May 2007, aimed at attracting bankers and mainstream financial institutions into the carbon market.

In order to scale up the participation of Africa in the carbon market, the AfDB is working with the World Bank and other U.N. agencies under the Nairobi Framework to improve coordination among the varied capacity-building activities and increase donor funding opportunities (see box 7).

The "High-Impact" Countries

In determining their country priorities, the MDBs have taken into account the differing magnitudes of GHG emissions by individual nations. For example, more than half of the GHG emissions in developing countries come from Brazil, China, India, Mexico, and South Africa.

In this connection, it is important to recognize that these five countries have initiated work on developing low-carbon growth strategies. China has recently published its low-carbon strategy to 2010 and will now embark on lengthening that time horizon to 2030. India's Planning Commission guided the preparation of alternative low-carbon development paths published last year and plans to build upon that work to consolidate the government position by the end of this year. In 2007 Mexico published a National Strategy on Climate Change that forms the basis for deepening the analytical work and facilitating implementation of low-carbon projects. Brazil has created a secretariat in the Ministry of Environment for

Box 8: World Bank Support to Assessing "Low-Carbon" Growth Strategies for India

The Government of India requested that the World Bank help assess (a) India's future GHG emissions across various sources, (b) the costs and local benefits of several alternative scenarios with different emission levels, (c) the incremental costs and other barriers of "lower carbon" growth trajectories, (d) the financial needs in different sectors for adopting technology options and programs, and (e) appropriate financing instruments to meet these needs. The work, led by the Government of India's Planning Commission in coordination with the ministries including Environment and Forests, Power, New and Renewable Energy, Transport, and Agriculture, as well as agencies, started in December 2006.

The scoping phase of the study has been completed and points to some important features of India's economy with respect to its GHG emission performance. Based on available data, methane emissions from agricultural activities are the largest source of India's current GHG emissions. India's CO_2 emissions, mainly from fuel use, currently account for 55 percent of its total GHG emissions, but the share is rising, as about half of the population currently lack electricity access and energy supply shortfalls constrain its fast economic growth. India has been relatively successful in delinking economic growth and energy use. Recently, economic growth has been increasing 8 percent a year, while commercial energy consumption has been growing just 3.7 percent.

A new model for estimating future GHG emissions under different scenarios and calculating marginal abatement costs—so that the model structure, data inputs, and underlying assumptions will be made as transparent as possible—will be used to generate a cost-effective strategy for further lowering the CO_2 and GHG intensity of the economy at the macro and sector levels, and identify opportunities for leveraging financial resources needed to achieve so without compromising growth. The study will also help formulate specific regulatory and investment programs in a range of sectors and develop a strengthened multisectoral program of WBG support. The strategy will highlight the many benefits that India can capture with a well-designed low-carbon strategy, including energy security, rural access through distributed renewable applications, cleaner air in cities and homes, reduced congestion, better waste management, and even less water-intensive agriculture technologies.

Interim results, analyzing GHG scenarios, costs, financial gaps, and available instruments to meet those gaps, for select sectors—thermal power, hydropower, energy use in building and households, and transport fuel economy—have been prepared and the full analysis and final report will be completed by summer 2008.

Climate Change and is in the early stages of developing a climate change strategy. South Africa established a National Climate Change Response Strategy in 2004 and is currently preparing a long-term climate change mitigation scenario due to be finalized in mid-2008. The World Bank is assisting all the above countries in developing these strategies.

The preliminary analysis to identify priority areas for a low-carbon development path already demonstrates the unique GHG reduction potential and key sectors for each country. For example, avoided deforestation, hydropower, and biofuels appear to be some of the key areas for Brazil, whereas the oil and gas and transport sectors are important for Mexico. In the case of India, GHG reductions could potentially involve areas, such as coal power plants; hydropower; EE in commercial buildings, households, and industrial sectors; transport fuel improvements; and land use changes in the agricultural sector (see box 8). Differences in the GHG reduction opportunities for China and India are also evident, despite the existing widespread use of coal, given the differences in the level of per capita consumption and access to modern fuels. The uniqueness of each country case suggests that a "bottom-up" approach is a crucial complement—for identifying opportunities in country-level, sector-specific mitigation actions—to the existing broad, global-level analysis carried out in the reports discussed above.

The EIB has recently approved a multiproject facility of €500 million for China to support projects that contribute to climate change mitigation. The beneficiaries are government agencies, municipalities, public utilities, and companies, including PPPs that invest in projects that contribute to the avoidance or reduction of GHG emissions through the use of renewable energies, EE, or the capture and use or storage of GHG.

Adaptation to Climate Variability and Change

The earth's climate is already changing because of human activities, primarily the combustion of fossil fuels and land management practices, and is projected to continue to change in the coming decades. Developing countries, and poor people within developing countries, are already suffering the greatest impact from climate-related disasters, which threaten to undermine their development. During the 1990s, an average of 200 million people per year from developing countries were affected by climate-related disasters, whereas only a million or so people from developed countries were affected.

Climate change has serious implications for the MDBs' poverty reduction efforts. It will affect areas of major economic and social importance for developing countries, such as water availability, agriculture, health, the durability of major infrastructure, and the sustainable use of natural resources. While adaptation has hitherto not received the same attention as the mitigation agenda, the MDBs, whose member countries will be most impacted by climate change, are making efforts to help these countries adapt to climate change extremes and variability through regional and country-specific programs. Institutions such as the World Bank, the ADB, and the AfDB are also in the process of upgrading their staff capacity in identifying and preparing adaptation activities. The majority of MDBs are now expanding their knowledge of climate risk management, implementing this knowledge in operational programs, and building more comprehensive screening tools and best-practice guidance to support their clients' long-term sustainable development goals.

Climate Risk and Assessment

Most MDBs are now "climate-proofing" projects that are climate sensitive and developing advisory assistance and capacity support mechanisms, as well as preparing systematic institutional and policy responses. This involves the development of screening tools in order to assess and mitigate climate risk in vulnerable projects. This will not only protect their investments from possible future damage, but is essential for achieving poverty reduction.

In the area of climate risk management and assessment, the World Bank is developing robust and easy-to-use information and tools for assessing development projects and programs for potential sensitivities to climate change for Bank and client country staff. A screening tool is now available and covers aspects of agriculture, water use, biodiversity, and some infrastructure and coastal issues. The screening tool is seen as part of a wider range of tools to support development practitioners. These include good practice guidance notes and structured sets of climate change training and leadership programs. The Bank, both internally and in cooperation with other agencies, is developing a comprehensive "portal" to provide ready access to information and data relevant to climate change. As part of the effort to develop methodologies for assessing the impact of climate change and determining appropriate strategies to respond, the World Bank, the ADB, and the Japanese Bank for International Cooperation (JBIC) Institute, are working together on a study of Climate Change Impact and Adaptation in Asian Coastal Cities (see box 9).

The ADB, AfDB, and IDB are also focusing on similar climate risk management initiatives in order to ensure that their operations are less vulnerable and more resilient to climate risk. The IDB is focusing on disaster risk mitigation and is making headway in mainstreaming disaster risk prevention in its operations. The ADB will assist its member countries in integrating CRMA into broader development and natural resource management decision making, whenever possible urging that adaptation concerns, whenever possible, be com-

Box 9: A Study of Climate Change Impact and Adaptation in Asian Coastal Cities

A study of Climate Change Impact and Adaptation in Asian Coastal Cities is being undertaken by the World Bank jointly with the Japan Bank for International Cooperation (JBIC) Institute, and ADB to assist the respective governments in identifying (a) what they should expect in the way of climate change impacts, and the scale of those impacts; (b) what adaptive measures they could employ to address the threat of climate change related impacts; and (c) what are the key policy priorities for decision makers to deal with the threat of climate change impacts.

The IPCC in its Fourth Assessment Report has identified megadeltas and the megacities in these deltas as hot spots, which will be impacted by sea level rise; increasing frequency and intensity of flooding from river drainage, storms and storm surges; and land subsidence resulting from both natural and manmade causes. Other studies, including the OECD's "Ranking Port Cities High Exposure to Vulnerability and Climate Extremes," have indicated that Asian coastal cities are particularly vulnerable, and also noted the long lead time necessary (30 years or more) to plan and implement effective coastal and flood defenses on the scale necessary.

To understand the socioeconomic vulnerabilities and developmental consequences better, the World Bank, JBIC Institute, and ADB have worked together to develop common terms of reference for city case studies and divided responsibility for the initial studies on four cities: Bangkok and Kolkata (World Bank), Ho Chi Minh City (ADB), and Manila (JBIC Institute). Other cities might be added later. These studies will provide an opportunity for cross comparisons to evaluate similarities and differences and to develop common approaches to adaptation that may have value for other Asian coastal cities. Building on the IPCC consensus, the JBIC Institute, with experts from the University of Tokyo and Ibaraki University, have adapted IPCC global climate models to forecast key climate variables on a regional level for the A1FI and B1 scenarios for the year 2050. These forecasts on changes in temperature, precipitation, storm surge, and sea level rise, which also incorporate other key historical and projected information on demographics, land use, land subsidence, and sector assessments, are being applied to the four city studies, which are now under way. A midterm synthesis report, which will be based on the case studies' first two tasks (historical data collection and hydrologic modeling), is expected shortly. A detailed impact analysis (task 3), together with suggested adaptation strategies for various sectors, including energy, transportation, water supply and sanitation, public health, and building and housing (task 4), will follow. The proposed adaptation measures will include a range of options, including (a) spatial or land use planning that directs new development toward areas less exposed; (b) upgrading protective defenses; and (c) reducing the human induced factors causing land subsidence.

bined with efforts to assess risk and reduce vulnerabilities to natural disasters. The ADB is incorporating these concerns into the country environment analyses as part of Country Partnership Strategy (CPS) and program preparation. This ensures that adaptation issues, where relevant, are included in the ADB's programs of cooperation at the country level. The AfDB will include systematic climate risk management analysis as part of due diligence in country planning and programming, and project preparation.

The IDB has done an initial assessment of the vulnerability of its portfolio to climate change impacts. The results indicate that a significant number of the Bank's projects could be sensitive to climate change. This is driving the Bank to factor climate-risk concerns into sector policies, country strategies, and project design and implementation. As a first step, the IDB is focusing on integrating adaptation issues in disaster risk prevention in its operations and in country programming, as well as developing guidelines to climate-proof infrastructure investments (see box 10).

Box 10: IDB Support for Adaptation to Climate Change and Disaster Mitigation—Township Planning Strategies for Storm Surges in the Caribbean

The general objective of the project is (a) to assist Caribbean countries in developing the adaptation strategies required to deal with the impact of natural disasters and severe weather events that are anticipated to occur in association with climate change; and (b) to strengthen their capacity for adaptation to this phenomenon. The specific objective of the project is to develop the capacity and methodology for incorporating risk analysis into the long-term development strategies of town planners and emergency managers.

The project has three components:

Risk Assessment of Pilot Sites: Storm surge risk assessments have been conducted in two pilot areas—St. Peter Township, Barbados, and Portmore, Jamaica—utilizing applications of the TAOS* storm surge risk assessment model. The risk assessments were prepared in close collaboration with the Caribbean Institute of Meteorology and Hydrology and in consultation with the regional emergency managers, town planners, and communities. The study also included (a) an institutional analysis for the implementation of risk management, monitoring and forecasting; (b) proposals for raising awareness; and (c) recommendations for the promotion of improved preparedness through early warning systems, contingency planning and shelters, and potential mitigation investments and cost-effective use of economic incentives for their execution.

Development of Toolkit: A toolkit targeting four types of users—town planners, emergency managers, community groups, and private sector providers of risk transfer services—will be developed. The toolkit will include criteria and guidelines for risk assessments, institutional issues, awareness raising and improved preparedness, and potential prevention and mitigation measures.

Dissemination: The toolkit will be published and disseminated throughout the Caribbean.

** The Arbiter of Storms.*

The EBRD region of operations is expected to be less affected by adaptation issues than other regions in the world where climate change may have very significant impacts on the ecology and economy of entire countries. Building on its experience in climate change mitigation financing, the EBRD is working on the development and implementation of a targeted operational approach to climate change adaptation. Within the EBRD's region of operations, the operational focus is likely to be on the management of water resources. Furthermore, the environmental due diligence of projects will need to enable the EBRD to "climate proof" its investments. Finally, better knowledge is required to guide the development of adaptation activities, since issues are local in nature.

Good-Practice Development

Many of the MDBs are undertaking a series of country, regional, and sector studies to build a body of good-practice guidance on managing climate risk. The World Bank will conduct a wide variety of sector and country assessments that include the effects of different climatic conditions on the main sectors of the economy and a review of institutional capacity to manage the climate variability. They will build on existing in-country or Bank-led initiatives, and will be designed to identify specific, achievable, prioritized actions. Particular attention will be given to "low-hanging fruit" opportunities, as well as institutional and governance bottlenecks for the implementation of adaptation measures. In this connection, each World Bank regional office is currently engaged in formulating a business plan for dealing with the threats and opportunities associated with climate change tailored to the specific needs of its client countries. The ADB is working with the World Bank on a similar initiative to assess the impacts of climate change in several large Asian coastal cities in relation of local and national economic growth,

as well as regional and global economics. The World Bank will also review the role of insurance and other modes of risk transfer as a means of reducing vulnerability to climate change. The AfDB is undertaking a study on the impact of climate change on the Gambia River Basin. In addition, there is a proposal to extend such a study to cover all the river basins in Africa.

Financing Climate Risk: Assessment and Adaptation

The majority of the MDBs will be focusing on mainstreaming climate change adaptation into development planning, poverty reduction strategies, policy work, and project activities. This involves financing country-level assessments of climate change vulnerability and risk assessments at both the strategy-program and project levels.

The World Bank has programmed a number of projects to address known risks to climate change. The lessons learned from these investments, together with the results of a series of pilots directly linked to Bank operations, will provide guidance on how to approach climate risk in upstream analytical and planning processes, as well as in the project and program implementation phase. Much of the work focuses on agricultural and water issues and rural infrastructure, since these are fundamental to poverty reduction in most regions of the world. Not only are they very vulnerable to climate risk, but typically they have had less work done on them than the more spectacular climate threats, such as a rise in sea level and wind storms. Adaptation-related activity by the World Bank has increased from only about 10 projects, and technical assistance and advisory activities before the CEIF have risen to about 40 projects (loan and grant) in 30 countries and 25 technical assistance advising activities.

The IFC is in the early stages of identifying appropriate methodologies for evaluating the risks of climate change to its investments and clients. In consultation with experts and other interested IFIs and private companies, the IFC has embarked on a series of case studies, to be completed by June 2008, to test available risk assessment tools, illustrate potential portfolio risks, and explore the feasibility of insurance and other response measures.

The IDB will integrate climate change adaptation initiatives into its disaster risk prevention activities. This not only includes mainstreaming climate risk in country programming, but also investments to reduce vulnerability to climate risk of urban and regional infrastructure. This involves identifying and protecting capital assets at risk to climate change impacts, preparation of loans to finance risk-reduction investments, and the design and development of vulnerability components and activities in investment loans. In addition, SECCI has generated two PBL—programmatic loans—to Mexico and Colombia, respectively, to help these countries develop climate change strategies and action plans. These action plans will include climate change impact analysis, and options for mitigation and adaptation within each subsector (energy, transport, housing, agriculture, and forestry services). The IDB has also commenced work on an adaptation toolkit.

The ADB will finance climate risk assessments at both the regional and national level through such programs as the Climate Change Adaptation Program for the Pacific (CLIMAP), which will review climate change risks (for example, sea level risk) while producing guidelines for development planners on how to climate-proof coastal infrastructure. The ADB also led the Central Asian Countries Initiative for Land Management, which brings together the five countries of that region to address land degradation problems, some of which are attributable to climate change. In addition, the ADB is sponsoring climate change risk analysis on natural resource productivity in the Greater Mekong subregion (see box 11).

Africa is highly vulnerable to climate change with the areas of particular concern being water resources, agriculture, health, ecosystems and biodiversity, forestry and coastal zones. The longer-term impacts will include changing rainfall patterns affecting agriculture and reducing food security, worsening water security and economic growth prospects, shifting temperature affecting vector diseases, and more challenging hurdles in reaching the Millennium Development Goals. According to the recent IPCC report, the cost of adaptation in Africa could be as high as 5–10 percent of the continent's GDP. The AfDB, in addition to its policy-related work, is preparing a formal proposal on the establishment of a CECAFA to galvanize its operations in this emerging area (see the section, New Financial Instruments and Methodologies for Carbon Finance, above and section 4 below). The AfDB is also increasingly engaged in activ-

Box 11: ADB Support to Climate-Proofing Pacific Countries

The ADB recently completed a three-year project to help selected Pacific DMCs to adapt to climate change and variability. The project produced a climate change stocktaking and risk profiles for eight countries, together with a support kit and guidelines for mainstreaming adaptation, with several examples of project briefs.

The analysis demonstrated the importance of mainstreaming adaptation in the Pacific, including strengthening the enabling environment to increase the likelihood of successful adaptation at project and community levels. The "National Guidelines for Mainstreaming Adaptation to Climate Change" were adopted by the governments of each country, and are now being used as the main references for adaptation mainstreaming at the national level. These are based on the approach presented in the widely disseminated main report from the study "Climate Proofing: A Risk-Based Approach to Adaptation." Capacity building for responsible government agencies and related stakeholders was also provided.

This project is being used by the ADB to expand its adaptation support not only to Pacific Island countries, but also to replicate across Asia through its Climate Change Adaptation Program, supported by the Regional Technical Assistance Project Promoting Climate Change Adaptation in Asia and Pacific (2007–11).

ities to reduce land degradation and soil erosion in partnership with the secretariat of the United Nations Convention to Combat Desertification (UNCCD) and the World Bank, NEPAD and other agencies within the Terrafrica/SIP sustainable land management program. In particular, a number of projects are under preparation to promote sustainable land management and rural livelihoods and climate adaptation in partnership with GEF, the World Bank, and IFAD within the GEF-financed SIP program. The AfDB has also initiated work on a portfolio of investment projects, including the Malawi Climate Adaptation for Rural Livelihoods and Agriculture project (CARLA), which is already under implementation (see box 12). Preparation work on two others, in Burundi and Mauritania, is well advanced.

The EIB may finance adaptation investment opportunities in sectors such as water resources, agriculture, coastal zone management and marine resources, forestry, and ecosystem management. For example, climate change is affecting and will increasingly affect hydrological regimes and water availability, particularly in developing countries located in especially climate sensitive regions. One of the areas to which the EIB is paying particular attention is flood risk management. In the Africa, Caribbean, and Pacific regions and in the Asia and Latin America regions, the EIB will continue supporting the EU development policy centered on the achievement of the Millennium Development Goals and related goals. These include MDG 7, which aims to halve the proportion of people without sustainable access to safe drinking water by 2015, and the similar target adopted by the international community with regard to access to sanitation.

The GEF is currently the world's largest funder of activities to address the adverse impacts of climate. Several MDBs, including the World Bank, ADB, and AfDB, are working closely with the GEF, which has funds available on the order of $200 million at this point.

Box 12: African Development Bank–Malawi Climate Adaptation for Rural Livelihoods and Agriculture (CARLA) Project

The project objective is to "improve resilience to current climate variability and future climate change by developing and implementing cost effective adaptation strategies, policies, and measures that will improve agricultural production and rural livelihoods."

The project is aimed at implementing the National Adaptation Programme of Action (NAPA) of Malawi and is eligible under the GEF LDCF, since it follows the principles and criteria outlined in the programming paper on the implementation of NAPAs under the LDCF. Malawi's 2005 NAPA, based on a multistakeholder consultative process, identifies two urgent and immediate priority actions that consist of (a) improving community resilience to climate change through the development of sustainable rural livelihoods, and (b) improving agricultural production under erratic rains and changing climatic conditions. The proposed LDCF project addresses these priority actions by implementing climate change adaptation measures to improve resilience and adaptive capacity in vulnerable districts in Malawi.

It builds on the baseline AfDB development project Smallholder Crop Production and Marketing, which has two main components: irrigation development and farmer support.

The NAPA component, financed by the GEF LDCF grant, will address the impacts of climate change by supporting the following:

- Investments aimed at improving agricultural, land management, and natural systems, as well as rural livelihoods through targeted, on-the-ground adaptation interventions, and through fostering adaptation of individuals, communities, and the private sector.
- Climate risk management, including plans, policies, legislation and regulations, and resource allocation; institutional coordination; generation and tailoring of knowledge on climate risk management for specific user groups (particularly in the context of the investment component); and awareness raising.

The project is targeted on strengthening the productive capacities of vulnerable communities, securing their livelihoods against the adverse impacts of climate change, and sustaining poverty reduction.

4: THE WAY FORWARD

The Collective Ambition of the MDBs

Based on their individual and collective experiences in implementing the CEIF, the MDBs are in the process of refining and deepening their climate change interventions to reflect emerging global priorities. This includes scaling up current and developing new activities with respect to access, mitigation, and adaptation. Much of this new agenda can be accomplished through the existing assistance instruments and resources already available to the MDBs. However, to support further scaling up, it is also critical that they have access to additional sources of targeted concessional finance if they are to maximize their impact on the reduction of carbon emissions in their client countries.

The overall ambition of the MDBs going forward can be summarized as a logical evolution of their climate change agendas. In this process, the emphasis shifts from broad global aspirations toward a much more explicit focus on assisting each of their developing and middle-income country clients integrate climate change issues, including adaptation and the identification of low-carbon growth opportunities, into their development programs while being careful to keep the focus on the key objectives of these programs. The MDBs would support this country led approach through finance, technology transfer, and capacity building. Success in this endeavor will also require the development of enhanced MDB assistance products, significant additional increases in the staff resources devoted by the MDBs to this effort, and further improvements in the way in which they work together. These issues and plans are discussed in more detail below.

On the assumption that the above plans are realized the MDBs would expect to see a continuing and substantial growth in their collective CEIF and climate change related lending and investment programs, including their energy access and low-carbon portfolios. These are summarized in table 1. It is important to emphasize that all the MDBs' public and private sector lending and investments programs are demand led and are ultimately determined by client governments and private investors. The numbers given below are projections not targets. They are based on requests and activities currently in the pipeline and as such may be subject to significant changes.

Access

Despite the progress made by the MDBs in improving energy access, power development, particularly in Africa, continues to represent one of the most difficult infrastructure challenges. The shortcomings of the power sector are manifold: insufficient investment in generation capacity, transmission systems, and distribution grids; poor efficiency and reliability of existing supply systems; and high costs of service. The resulting low reliability of electricity supply negatively impacts business activity, through lower productivity and competitiveness, as well as the delivery of public services. The inability to meet basic household needs through simple lighting further diminishes social welfare.

Given recent levels of growth in GDP and accompanying electricity demand of 5 percent per year or more in many SSA countries, generation capacity needs to expand by about 4 GW per year, but only about 1 GW is being added annually. Serious drought in many countries has reduced hydropower generation, and inadequate maintenance and reliability of power

Table 1: MDB CEIF/Climate Change Lending/Investments ($ billion)

	2003/05[a]	2006	2007	2008	2009	2010
Energy						
Lending/investments	6.0	9.4	10.0	13.8	15.7	16.2
Total cost of projects/ programs supported	17.6	28.1	24.9	35.8	39.5	42.4
Energy Access[b]						
Lending/investments	1.3	2.0	2.4	4.4	5.3	5.8
Total cost of projects/ programs supported	3.4	5.5	7.5	12.2	14.9	17.4
Low Carbon[c]						
Lending/investments	1.9	3.7	4.7	7.6	9.4	10.6
Total cost of projects/ programs supported	7.9	16.8	15.4	28.6	36.2	41.3
CTF[d]						
Total cost of additional projects/ programs assuming CTF materializes		n.a.	n.a.	n.a.	9	15

n.a. Not applicable.

Note: The numbers for EIB in this table include only EIB lending/investments to middle-income and developing countries outside the EU. Adaptation investments are excluded.

a. Annual average 2003-05.

b. For countries eligible for access to the soft loan windows of the MDBs, these include all generation, transmission, and distribution projects, since they are all needed for increased electrification. For the other developing countries, only projects specifically aimed at increasing electricity access, such as rural electrification, are included.

c. Low-carbon projects include RE projects (including all hydropower projects), EE (including EE resulting from investments in water sector, mass transit, and industrial investments), power plant rehabilitation, district heating, biomass waste, gas flaring reduction, high-efficiency, coal-fired thermal plants (supercritical and ultra-supercritical), methane capture and reduction, and forestry.

d. This assumes that $1.5 billion of CTF will be committed in 2009 and $2.5 billion will be committed in 2010.

systems has exacerbated the shortfalls in supply. Load-shedding and unplanned power outages are frequent across the continent. African manufacturing enterprises report an average of 56 days of outages per year, and sales losses of 5–6 percent and more because of power shortages. Many firms must operate their own generators at costs of around $0.50 per kilowatt-hour, and the cost of emergency power supplies has become a major burden to a number of countries.

Poor financial performance and high costs in many power systems have hampered their ability to extend their distribution systems and impeded the affordability of electricity to lower income levels. Most of SSA's power systems and generating units are small by international standards and have substantial diseconomies of scale. Many are landlocked, which further increases fuel and other costs. Even though tariffs are high compared to other developing countries, averaging about $0.13 per kilowatt-hour. In most cases, this barely covers operating costs and leaves little cash flow available for investment in expansion. Even though there is room for tariff reform in many countries, issues of affordability and political pressures have meant that very few utilities have tariffs that reflect long-term costs.

The severe power shortage gripping the subcontinent during the last two years has further threatened sector outcomes. A combination of oil prices at historical highs and drought-induced hydrological stress has exacerbated existing supply constraints. The focus of policy makers, for example, Ghana, has

recently shifted to alleviating the immediate power crises. The WBG has reacted by reallocating its resources to meet this challenge, assisting several countries with financial support for emergency measures, such as in Senegal, Sierra Leone, and Uganda. The combined effect of these funding shortfalls and power supply shortages in many countries, as well as weak planning, policies, and capacity has meant that the goal of increasing access is being seriously threatened.

While it is too early to conclude that the objectives of the Action Plan to increase modern energy access cannot be achieved, indications to date are that the earlier targets will need to be scaled down unless and until concessional funding and private investment are scaled up at least to the levels foreseen in the plan. China, a major new actor in the sector, has committed very large amounts of funding in a number of countries, but it remains to be seen how quickly project implementation will occur. More recent analysis indicates that the increase in required funding foreseen earlier to about $4 billion annually is an underestimate, given the recent investment shortfalls and widespread increased rates of growth in demand and increased equipment costs. Much more work needs to be done with the donor community, private investors, governments, and utilities to determine how and whether the required levels of funding can be achieved.

While the earlier premise that the key ingredient to mobilizing funding was getting the sector policy and governance framework right, this has proved to be somewhat challenging to implement. Too many countries simply do not have the governance and capacity to establish satisfactory policy frameworks and an attractive environment to attract increased concessional funding or private investment in the required time frame. This means that the MDBs' other donors will have to be more pragmatic and flexible in their approach, appreciating that developing the requisite investment climate will likely take longer than expected.

The prevailing view held during the 1990s and early 2000s that the private sector should become the main source of power investment funding has simply proved to be unrealistic in most of SSA. While there has been a substantial increase in private sector participation in some projects, the results have been mixed and uneven across the continent. It has been become apparent that the types of reforms pushed during the last 10–15 years have been problematic in many countries, particularly those with small systems and inadequate investment environments. Greater pragmatism is called for, and a recognition that power systems dominated by the public sector are likely to prevail in most of SSA for some time.

Fresh approaches are needed to engage the private sector, and to address the capacity and performance problems of the SSA power utilities. Some power companies have reasonable levels of performance, but more common are those with frequent outages, high losses, low collection rates, other inefficiencies, and an inability to contribute meaningfully to future investment from cash generation. While management contracts have had mixed results, and privatization has been very limited, there are lessons to be learned and applied that might work more effectively in a larger number of countries.

A concerted effort is required on the part of governments, utilities, donors, private investors and regional organizations to address the opportunity of large regional projects with the accompanying cross-border transmission interconnections. While such hydropower prospects as Inga in DRC and Gilbe Gibe in Ethiopia and gas-based systems in Nigeria and elsewhere have been discussed for years, a concerted international effort to bring these into fruition could help to transform the African power sector, supplying large amounts of power at lower costs than today's expensive systems, and doing so with substantially lower carbon emissions that the current tendency toward more fossil-fueled capacity would produce.

Contrary to the original expectations, financial instruments existing at the time of the Action Plan have not proved adequate to meet the requirements. While the MDBs demonstrated that their mix of instruments including grants, credits, partial risk guarantees, MIGA, the IFC and carbon funds can be deployed to great effect in many circumstances, it is evident that new financing sources and tools need to supplement this mix. There are prospects for bonds in some countries and new carbon facilities that could help to fill the financing gap that still persists.

Both the AfDB and the World Bank plan to further scale up their energy access activities, as well as to explore new approaches designed to tackle the issues highlighted above. Specifically, the World Bank is updating the Action Plan that was incorporated into the CEIF framework approved in March 2007, and the AfDB's own CEIF, of which increased energy access is a significant component, was approved by its board in March 2008. The key factors to achieving success lie in simultaneously tackling power availability, the extension and reliability of distribution networks and affordability. Africa's formidable energy resources remain largely untapped: less than 10 percent of potential hydropower capacity has been exploited (the AfDB estimates that at least 50 percent of SSA's electric power needs under the scenario of attaining universal access by 2030 could be supplied from hydropower); the reserves-to-production ratio for natural gas and coal are 79 years and 192 years, respectively; and the energy dissipated via gas flaring alone would be enough to meet half of the continent's energy demand. Most countries, if acting in isolation from their neighbors, would be forced to develop assets that would be higher in cost than regional projects because of the modest size of their markets. To reduce costs, the MDBs are increasingly emphasizing the need to develop resources as regional projects, reducing unit costs of supply and making electricity access a real and affordable prospect. In parallel, adequate investments in deploying wind, solar, and biomass resources are also required to reach isolated communities.

The World Bank estimates that combined concessional resources from bilateral and multilateral financing institutions in support of energy sector operations in SSA in recent years have averaged around $2 billion per year. It is promoting a doubling of these resources to $4 billion per year. At this level of financing, however, the AfDB has noted that access to electricity in SSA would increase from the current level of about 24 percent of the population to 35 percent in 2015 and 47 percent in 2030. While realizing that the 2015 target may be somewhat ambitious, reflecting the realities highlighted above, the AfDB believes that the 2030 target is too timid, and has urged that it be revised upwards. They note that the latter target compares unfavorably against a projection of 50–55 percent of SSA population dwelling in urban areas by then. It would mean that a large segment of the urban population would still lack access to electricity in 2030, or very little change would have taken place in the rate of rural electrification. These scenarios may thus be reconsidered.

In developing Asia, there are large variations in access among countries, for example, electricity access rates are 20 percent in Cambodia, 56 percent in India, and 99 percent in China. The ADB has been very active in providing financing for rural electrification projects and policy advice especially on subsidy and cost recovery mechanisms. As highlighted in section 3 above, the ADB has been particularly active in expanding access in rural energy. The ADB intends to further drive this agenda through its recently approved Energy for All initiative. The initiative will make available more than $2.4 million of funds to develop new approaches and methodologies for promoting access of the poor to reliable and affordable modern energy services, and then to scale up to levels that can be supported by concessional funds.

Mitigation

Assisting Clients in Integrating Low-Carbon Growth Opportunities into Their Sustainable Development Strategies

The identification of low-carbon growth opportunities within their own sustainable development strategies is a key challenge facing the developing countries. As noted in section 3, country-led work on these issues in Brazil, China. India, Mexico and South Africa, which account for more than half the GHG emissions of the developing world, is well under way. It is important that MDB support for these efforts be progressively expanded to other key developing countries while at the same time not undermining the principle of country ownership. In this connection the EBRD has been developing comprehensive approaches to major GHG-emitting countries in its region of operations, including Ukraine

and Kazakhstan (in addition to Russia), and the World Bank has initiated similar work in Indonesia. Candidates for the next round include Colombia, Egypt, Pakistan, Thailand, and Vietnam, among others. The ADB has also been assisting Indonesia, Pakistan, the Philippines, and Vietnam on key aspects of this work, particularly with respect to EE opportunities. IDB is working on similar issues in Chile and Nicaragua, in addition to Brazil and Mexico. Given the need to avoid duplication and ensure maximum leverage of limited resources, particularly with respect to scarce staff expertise, the MDBs are committed to working closer together in assisting their clients to integrate climate change into their development strategies.

It is important to note that some of this analytical work has already achieved some early results. An important recent set of findings indicate that there may be considerable "no-regrets" potential for GHG emission reduction by improving the effectiveness of the existing assets through better use of technology, improved financing capacity in the sector and institution-building. For example, if the bottom 70 percent of the thermal power plants in India were operating at the same efficiency as the top 30 percent, emissions would reduce power sector CO_2 by 16 percent. Taking assets out of service to upgrade them is not feasible in states that face load shedding problems. Therefore a three-pronged approach is being developed in which (a) improving the financial health in the sector to enable accelerated implementation of new assets will decrease emissions from existing plants by enabling better maintenance practices and decreasing their duty cycle; (b) rehabilitation of existing assets that still have more than 10 years operation left; and (c) replacing plants coming near to the end of their economic life with new, more efficient plants. The World Bank is currently preparing two such pilot projects in India and China with GEF support, with opportunities for further scale-up once the new CTF, under discussion with donors, is operational. Within the overall LCGS framework, the MDBs will continue to highlight the key policy issues that must be addressed by governments in order to unlock the potential for climate change mitigation investments, particularly from the private sector. These include cost reflective and nondistorting pricing that incentivize energy saving, appropriate regulatory frameworks that promote RE, realizing opportunities within the Kyoto carbon trading regime, standards and labeling, incentive schemes and, appropriate housing legislation.

Fine-Tuning the MDB Mitigation Strategies

As the lessons of experience of the post Gleneagles period become apparent, each MDB has been engaged in a continuous process of refining their climate change interventions. For example IDB is focusing implementations and translating its broad targets into specific programs and projects; the ADB is striving to transform its project pipeline to help its DMCs move toward lower-carbon economies, considering ways to leverage better the resources available from its public and private windows, and targeting the removal of barriers to the introduction of cleaner technologies in its client countries and; the EBRD is focusing on further scale-up, as well as innovation in both instruments and new thematic areas. Many of these emerging perspectives are discussed in section 3 above, but some additional priorities going forward are highlighted below.

Since launching their new initiatives, the MDBs have shown that a significant scaling-up of investment activities can be achieved in a short time. Since many of the opportunities for climate change mitigation are accessible using the MDBs' existing and proven instruments, future activities will focus on opportunities to further scale up the deployment of these instruments, thus promoting the transition to lower-carbon economies through demonstration of energy savings, overcoming of market barriers, and mobilization of the private sector. In the context of rising energy prices, both as a result of global market trends and as a consequence of continuing reform driving down subsidies and internal energy market distortions, industrial EE is expected to remain a strong activity area, particularly for the EBRD and the private sector arms of the other MDBs. The World Bank is also consulting with other MDBs and development partners to identify key gaps and barriers in the financial architecture for low-carbon and climate-resilient investment, and to explore ways to make more effective use of existing instruments to finance climate-friendly investment.

The scope for further EE investment in district heating, housing, and water systems also remains significant. For example, building on its strong network of relationships with municipalities across the Eastern European region, there is a good potential to further increase the EBRD's investment in municipal infrastructure

EE, provided that appropriate grant support remains available, particularly in the poorer countries of the region. The buildings sector currently accounts for around 40 percent of global total final energy consumption. It has been identified as offering the largest single potential for EE as much of this consumption can be avoided through the use of currently available, commercially viable, EE technologies. However, achieving this huge potential is not straightforward because of the highly disaggregated nature of investments consisting of thousands of individual projects, and a number of intricate barriers to investment that need to be overcome. Another critical issue is the principal agent problem in which the owner of the assets is often not the same entity that pays for operating costs. However on average, energy savings of around 50 percent can be achieved through the renovation and thermal modernization of these buildings. Virtually all the MDBs are therefore planning to strengthen their interventions in this area, including channeling additional funding through financial intermediaries (ADB, EBRD, IFC, and IDB), and renewed support for ESCOs whose performance across the emerging markets and the developing world has been uneven to date.

There appear to be significant opportunities for the MDBs to further leverage their collective efforts on thermal power and to help their clients achieve significant GHG reductions per megawatt. With the aging of power network infrastructure, demand on the MDBs for rehabilitation and in certain cases replacement financing is likely to increase (particularly in Eastern Europe, the FSU and South and East Asia). The role of coal as a major energy source for power generation, particularly in Eastern Europe, India and China, is likely to remain significant and in many cases to increase as a result of rising energy security and costs concerns. A shift to ultra-supercritical boilers would allow efficiency increases to rise from a current average of about 34 percent for a new conventional power plants to about 43 percent with significant benefits in CO_2 reduction and reduction of other emissions. Advanced technologies may permit efficiencies of up to 50 percent. The investment capital cost increment of a shift from conventional to supercritical is estimated at around 5 percent. Furthermore, the power equipment manufacturing industry is experiencing a substantial increase in their turnover, making them extremely selective on new projects. Order books for the main international suppliers for these advanced technology plants are already filled for several years. For existing capacity, the MDBs will continue to emphasize improving the net efficiency of the power plant focusing on its operations and maintenance. For investment projects in the medium to longer term, the MDBs will attempt to actively promote the transfer of advanced technologies, particularly for the larger plants where these processes are more attractive. Another possible initiative is the development of a joint program designed to support the development and commercialization of IGCC with CCS. In this connection it will be vital to ensure that the lessons of experience gained by the EIB from its CCS projects be transferred to the clients of all the MDBs.

While there is significant scope for the development of RE, including hydropower, wind, geothermal, and biomass, overall RE investment and financing, with the exception of hydropower in some countries, remain very limited. It is therefore important that the MDBs continue to innovate in these areas. For example, in most EBRD countries with significant forest cover (Albania, Belarus, Bulgaria Bosnia and Herzegovina, Czech Republic, Croatia, Estonia, Georgia Latvia, Lithuania, Poland, Russia, Serbia, Slovakia, Slovenia, and Tajikistan, and with forest cover exceeding 30 percent), the average use of biomass is less than 1 percent of primary energy supply (IEA 2007)—this compares with countries like Finland and Sweden with 15–20 percent. There is thus great potential for increased use of biomass. Barriers to growth in the sector, including reluctance among major energy and fuel suppliers, a lack of focus by vehicle and boiler on the sector; lack of appropriate policies, and political uncertainty about how to support the sector; technological and process costs that make biomass uncompetitive compared to conventional fossil-based sources; lack of awareness among consumers of the benefits of biomass; and fuel chain complexity resulting from logistical problems in collection, distribution, and storage of biomass fuels. Furthermore, while the uptake of solar panels of solar thermal or PV technology has so far been very modest in those countries with good grid access—for example, Eastern Europe and China—the prospects for these technologies in those countries with low grid penetration—for example, SSA—are promising in some markets, even at current investment costs. The scope for additional interventions by the

MDBs in these areas, particularly if more concessional financing becomes available, is significant.

Related to the above, the MDBs are also increasingly focusing on the development of strategies designed to overcome the barriers to accelerated deployment of advanced clean energy technologies in developing countries. The World Bank has recently completed a report that examines the need for new clean energy technologies to address climate change, the barriers to accelerated commercializing such technologies, and examples of novel approaches to innovation from nonenergy sectors that could be applied to clean energy. The Bali Action Plan, the IPCC Fourth Assessment Report and the Stern Review make clear that a renewed push on clean energy technology development is essential to stabilize and then reduce anthropogenic CO_2 emissions. Activity in this area had fallen considerably after peaking in the early 1980s. However, in recent years, this trend has reversed as climate fears and high oil prices are rapidly increasing interest in new, alternative sources of energy. This "green tsunami" of public and private investment nevertheless faces a number of barriers, among them an uncertain carbon price, difficulties adapting and diffusing technologies in the developing world, and the "valley of death" wherein technologies languish whose scientific proof of concept has been proven by basic research, but which are still viewed as too risky by the private sector to take up. In order to inform novel and creative approaches to clean energy research, development, and deployment (RD&D), the World Bank report examined four case studies of successful technical innovation from nonenergy sectors (vaccines, biotech, agriculture and software) that have overcome barriers similar to those faced in clean energy.

The EBRD is also exploring novel approaches in this area. The development of clean technologies in the Bank's region of operations can provide a relevant input to promote accelerated EE gains and carbon intensity reduction. There is rising demand for clean technologies in the eastern European region, which already has the needed strong engineering basis to develop innovative technological solutions. However, there is a funding gap for these technology based businesses. There are already many such companies active in the private sector; however, they need access to further capital in order to grow. For the first time in nearly 10 years, the Bank invested in 2006 in a venture capital fund as the industry slowly emerges in the region. The EBRD hopes that this trend would lead to an expansion of clean technology-related investments. The key market constraint expressed by RE developers appears to be on early stage project development funding. Accordingly, a fund that can invest in multiple small development stage investments would allow the Bank to play an active role in this segment of this nascent market.

The AfDB proposes to create a multidonor funded Clean Energy Access and Climate Adaptation Facility for Africa (CECAFA). This facility will be designed in such a way as not to duplicate other international and regional funds (like the Climate Investment Facility and Congo River Basin Fund that are currently being established to address similar issues) but will be complementary. It is expected that the CECAFA will be one of the financing mechanisms for channeling some of the resources from these funds to African countries. The CECAFA will do the following:

- Support suitable activities in all the Bank's RMCs on key issues in clean energy access and climate adaptation in Africa.
- Create a critical mass of technical expertise in the Bank.
- Focus particular attention on the challenge of overcoming rural energy poverty by sustainably harnessing local RE potential.
- Ensure flexibility in order to allow the facility to finance activities of a wider range of stakeholders, to process smaller-scale operations, undertake riskier piloting operations, and disburse at a faster rate than are possible under the principal financing windows of the Bank Group.
- Target awareness raising, economic and sector studies, technical assistance, advisory services, internal and capacity building, and project preparation financing for clean energy strategies.
- Provide assistance will be provided on integrating clean energy access in national poverty reduction strategies and regional development strategies.
- Provide support to project developers in RMCs (including local communities) to strengthen their capacity to formulate CDM-eligible projects.

- Continue the mandate of the FINESSE program in support of the mainstreaming of RE and EE and energy poverty reduction strategies in the development plans of RMCs and in operations of the Bank Group.

Finance for the fund is being sought from the Bank Group's regional and nonregional shareholders. In addition, consideration is also being given to inviting major private sector corporations and nongovernment entities to participate on a selective basis. The funding structure and the governance of the facility will provide not only oversight, but also a platform upon which to build effective partnerships to tackle the constraints to energy access, clean energy and low-carbon development, and poverty reduction in Africa.

The ADB is also developing a proposed Future Carbon Fund (FCF) designed to leverage post-2012 carbon market credits for clean energy projects through upfront financing using the CMI model. This holds significant implications for investment, since a typical wind or hydropower project will continue to generate emissions reductions well beyond 2012; the combination of the existing APCF and proposed FCF could conceivably finance between 20 percent and 40 percent of total project cost.

For IDB, SECCI has proven to be an excellent generator of new operations and a useful mechanism to strengthen existing operations. During the first quarter of 2008, the demand for operations with SECCI components was high, and has already reached 60 pipeline operations—all approved during the course of this year. Throughout the course of 2008, SECCI will be expanding the ways in which it supports national Banks (such as Bancomext-Nafin in Mexico), and regional Banks (such as Brazil's BDMG), and private Banks (Bancolombia, Colombia). Funding will be provided for a number of activities, including pre-investment studies to identify sustainable projects, EE evaluations, carbon finance, and technical assistance for components within the project cycle.

As noted in section 3 above, the transport sector is a major source of carbon emissions in the developing world. Given the critical impact of road transport on climate change in Asia, the ADB, as highlighted above, has completed an important analytical paper on this issue and is developing an action plan designed to address the problem; however, implementation has only just commenced. Given the significant investment made over time in the cities of most of its countries of operations, the EBRD is also giving particular attention to the development of public transport rehabilitation projects that result in both increasing the EE of public transport networks and providing a lower carbon urban transport alternative. The World Bank has also updated its transport strategy to fully reflect the new climate change priorities. However, it needs to be emphasized that most of the MDBs have only begun to tackle this agenda item. In light of the enormity of this problem, the difficult policy issues involved, and the formidable challenges of implementation, the MDBs are committed to individually and collectively focusing their professional expertise on this subsector, with a view to raising its priority and developing effective interventions.

Despite the importance of deforestation as a major contributor to GHG (close to 20 percent of the total emissions), the MDBs' assistance programs in this area remain quite modest. Reducing the rate of deforestation is an exceedingly complex policy, regulatory, governance, and financial challenge that the traditional products of the MDBs are not necessarily well suited to meet. However, given the importance of urgently tackling this global issue, the MDBs, particularly those with the most seriously affected client countries, are committed to substantially raising the priority they attach to reducing the rate of deforestation and to articulating a consistent set of remedial strategies and programs. The advent of the FCPF will hopefully provide an opportunity to make further progress on this cooperative endeavor.

Adaptation

As indicated in section 3, the work of the MDBs on adaptation to climate change remains quite modest, relative both to their mitigation activities and the global adaptation challenge. Indeed, the MDBs are only now staffing up in response to these demands. This is not surprising, given that adaptation has only recently been recognized as a major global priority and that the challenges of adapting to climate change are both complex and not yet fully understood. Moreover, the impact of climate change varies significantly from one region to another. For example, the clients of the AfDB, ADB, and IDB will be far more seriously affected than those of the EBRD. The current food price crisis and the expected early impacts from rising temperatures on agricultural production in developing countries underline the need for prompt adaptation interventions that will avoid or at least cushion the adverse impacts on poor communities. In light of these realities, the MDBs, especially the World Bank, ADB, IDB, and AfDB, are developing a more ambitious and coherent set of adaptation products (investment and policy) designed to leverage each other's strengths and build the needed staff capacities. For example, the ADB has recently initiated Promoting Climate Change Adaptation in Asia and the Pacific, a technical assistance project that is designed to mainstream adaptation into investment planning, and to broadly disseminate the results to member countries and donors so that a strengthened international community response for adaptation can occur. In parallel, the ADB is also developing measures to integrate risk management and adaptation concerns into country and sector strategies The EBRD has also begun a process of evaluating the potential impacts of climate change on its countries of operations and assessing operational implications, both in the areas of environmental due diligence and strategic environmental assessments and with regard to operations and instruments. The EIB has also recently issued a new statement on its Environmental and Social Policy (Principles and Standards) that commits EIB to climate proofing projects particularly sensitive to climate change. The World Bank has also initiated a global study designed to better understand the economics of adaptation to climate change (see box 13).

Reflecting the reality that Africa is the most vulnerable region to climate change, the AfDB has initiated a process to develop a comprehensive CRMA. An approach paper was discussed by the Bank's board in early April, and the new strategy is expected to be finalized by October 2008. The approach paper emphasizes country ownership and alignment, integration of current and future climate risks, selectivity and complementarity, the importance of playing a catalytic role, and partnerships at the local and international level, particularly with the other MDBs. The strategy is expected to stress the need to ensure that Bank Group operations, starting with those that are most climate sensitive; have sufficient resilience to projected climate change; have support for RMCs capacity building and awareness raising of country-specific vulnerabilities, climate risks, threats, and opportunities; support for RMCs to implement effective CRMA in national planning and to develop sectoral strategies for climate-sensitive sectors, such as agriculture, natural resources management (including reforestation and afforestation), health and human settlements, water resources, urban and other key infrastructure and disaster risk reduction, and the integration of these activities, to the extent possible, in regular Bank operations. The AfDB is also reviewing its assistance instruments and business processes to ensure that they are supportive of the evolving strategy.

As noted above, the AfDB is currently preparing a formal proposal for the establishment of CECAFA to support both its mitigation and its new adaptation agenda. By 2010, the bank expects to be able to provide financial support for 5–10 climate-adaptation activities per year in all the WBG's RMCs. Eligible adaptation activities will include the following:

- Increasing public awareness of vulnerability to country-specific climate change, including support to the Action Plan for Africa on Climate Information for Development Needs (ClimDev Africa) jointly implemented by UNECA, the AfDB, and GCOS, under the leadership of the African Union.
- Building or reinforcing private sector and public institutional capacities at community, national, and subregional levels to manage increasing climate variability and extreme weather events—including emergency response logistical

Box 13: The Economics of Adaptation to Climate

The World Bank in partnership with the British and Dutch governments is conducting a worldwide study on the economics of adaptation to climate change. Building on significant knowledge and analytical work on adaptation measures in several case studies that include Bangladesh, Brazil, Ethiopia, Ghana, Mozambique, Peru, and Vietnam, the study will provide recommendations and inform the international development community in the context of the United Nations Framework Convention on Climate Change 15th Conference of the Parties in Copenhagen in December 2009.

The report aims to help policy makers in developing countries understand better the risks and tradeoffs posed by various adaptation measures. A prior understanding of how to estimate the costs and benefits of adaptation measures and how to prioritize policies that embrace both development and climate change issues in the context of uncertainty is a crucial requirement for integrating robust adaptation strategies in the development plans and budget management of developing countries.

A core team will be responsible for reviewing existing analytical and practical knowledge and methodologies on adaptation. This team will work closely with local institutions and experts who will be responsible for carrying out the country case studies. The core team will provide overall support and technical assistance, and will ensure consistent approaches. Both microeconomic and macroeconomic perspectives will be used, based on national, sectoral, and local level of analyses, as well as integrated assessments. Lessons from the country case studies will be generalized to other developing country contexts.

Given the urgency of both industrial and developing countries to find adaptation experience from the perspective of developing countries, the study will inform further new initiatives in respect to the adaptation agenda.

capabilities, strategic stockpiles (such as food and medicines), disaster insurance, and reinsurance.

- Mitigating the increasing threat of vector and waterborne diseases engendered by rising surface temperatures—by expanding the Bank Group's Rural Water Supply and Sanitation Initiative (RWSSI), financing related activities also under the African Water Facility programs, and including support to fight malaria and other waterborne diseases.
- Countering rising stress on ecosystems and natural resources, including biodiversity support to concerted efforts to preserve coastal mangrove forests and other wetland ecological systems, and efforts to arrest deforestation of mountain slopes and soil erosion.
- Protecting against the increasing threat of extreme weather events and the flooding of coastlands and small islands from the rising sea level, with accompanying loss of infrastructure; supporting research into more ambient, resilient, safe, energy- and water-efficient housing design and building materials; reviewing possible defenses, for islands and coastal lands, against flooding and the rising sea level.
- Climate risk management in Bank Group projects, programs, plans, and strategies. This includes, on the one hand, due diligence in AfDB Group projects, and on the other hand, integration of climate risk management in Country Strategy Papers and sector strategies. For projects, systematic climate risk management should be included in the preparation, resulting in all Bank Group operations having sufficient resilience to current climate variability risks and projected climate change threats and making effective use of opportunities. Over time, this should become systematic good practice in all operations, but in the short term, the Clean Energy Access and Climate Adaptation Fund for Africa program (CECAFA) will support building tools and best practices in selected projects, including the following:
  - Retroproofing previously approved operations still under implementation or post completion (where still practical and beneficial.
  - Systematic climate risk management in new operations, leading, in high-risk cases, to modified investments, including climate risk management components additional to standard project design. The project-level climate

risk management would be implemented through a two-step process: (a) initial—also simple and cheap—tool-based climate risk screening, possibly building on the World Bank's efforts in this area; and (b) in-depth risk assessment for projects or components at substantial risk (often using specialized consultants).

To some extent, the MDBs' overall progress on implementing widespread adaptation has been hindered by the lack of sound estimates of the scope of the task and the financial implications. Developing countries are often unwilling to borrow for discrete adaptation activities, and some appear to be reluctant to act until resources that are clearly "additional" to ODA budgets are made available for the imposed costs of adaptation. Although most donors agree with the need to support adaptive actions in the most affected developing countries, progress has been difficult, since there were no clear estimates of the likely scale of the financial support. There is also still little agreement over what is meant by the "costs of adaptation." It is clear that the costs of some development actions will increase as a consequence of climate change (for example, greater expense on coastal defenses, and more damage from extreme events). The capacity building and analyses required to factor in climate change are additional and will require new resources, although these are relatively modest (a few tens of millions of U.S. dollars per year). The bulk of the new investment will be needed to modify and expand infrastructure (existing and planned), to make changes in livelihoods, such as changes in farming practices, and even to facilitate migration where that proves necessary. However, specific adaptation actions would usually only be implemented where benefits outweigh the costs associated with alternative actions or inaction. Thus there is still disagreement over how these additional costs and investment flows should be calculated. Also, many agricultural systems and much infrastructure are not adequately adapted to current climate conditions and the question arises as to whether making up this "adaptation deficit" should be included in cost estimates?

Initial World Bank estimates (spring 2006) suggested that $1–4 billion per year would need to be directed to adaptation actions to "climate proof" global concessional finance for development, which is an order of magnitude greater than current funding levels. During 2007 a study coordinated by the UNFCCC secretariat of the investment needs for mitigation and adaptation in 2030, it was estimated that the adaptation needs would be $28–67 billion. Other groups using slightly different approaches and assumptions to get compatible estimates. With the initial support of the Netherlands and the United Kingdom (other donor countries have expressed interest), the World Bank is leading a Global Economics of Adaptation study to "understand how to identify and prioritize adaptation measures and to estimate the financial costs of ensuring national development plans are climate resilient." The study will focus on several countries and will be executed in cooperation with several research organizations in both developed and developing countries.

In light of the above, the World Bank is placing priority on piloting a comprehensive and integrated adaptation planning process in a select number of developing countries over the next few years, with donor support under the proposed CTF. Such trials will require the full engagement of all levels of government within the selected countries and significant resources to not only implement fully integrated planning, but to support immediate actions that are identified. Resources would be made available to support governments to assess risks and plan for cost effective climate resilient development; to develop comprehensive, nationally owned frameworks, integrated into PRSPs and other core planning processes; and to strengthen institutional arrangements. Lessons learned and knowledge generated through the pilot program should support programs under the CTF, as well as IDA and other highly concessional finance and grant resources through normal aid channels.

Mobilizing the Private Sector

Success in achieving a global low-carbon growth trajectory is of course ultimately dependent on climate friendly investments by the private sector—the expected source of more than 80 percent of investments for climate change mitigation and adaptation according to UNFCCC and other estimates. Given the EBRD's overall mandate, the private sector has been at the core of the EBRD's approach since the inception of the SEI. Indeed, a major contributory factor to the rapid scale-up of the SEI has been its business-driven imperative. For example, in 2007, 84 percent of the EBRD's investments of €1 billion under its SEI went to the private sector. The IFC and the private sector arms of the other MDBs are now expanding their own programs to respond to the private sector challenge. For example, the IFC is placing increased emphasis on "cleaner" production in its support for general manufacturing projects, an initiative that to some extent mirrors the EBRD's success in identifying energy efficiency opportunities early in the project cycle.

A successful and large-scale private sector approach in turn requires a continuing focus on country policy and regulatory regimes to ensure a conducive enabling environment that provides the needed incentives for low-carbon and climate-resilient projects, as well as specific support for private sector operations. For example, the EBRD has linked its transition oriented investments to policy dialogue with authorities at the sovereign and subsovereign levels. The SEI is highlighting the key policy issues that must be addressed by governments in order to unlock the potential for climate change mitigation investments, particularly from the private sector. These include cost-reflective and nondistorting pricing that incentivizes energy saving, as well as appropriate regulatory frameworks that promote RE, realizing opportunities within the Kyoto carbon trading regime, standards and labeling, incentive schemes, and appropriate housing legislation. In a number of countries, the EBRD is developing Sustainable Energy Action Plans for discussion with the authorities that set out the investment objectives and key related policy issues. The other MDBs, particularly the World Bank, have also continued to place heavy emphasis on such policy work in their client countries. The leverage that the MDBs are able to apply on these issues reflects the significance of their investments, as well as their capacity to mobilize concessional funds. The potential role of new donor funds (see next section) in helping to facilitate and leverage climate-friendly private investment will thus be critical.

The negative net cost of many EE projects implies that the private sector should be financing them once a range of market failures can be overcome. Policy reform can deliver important gains here. Yet mobilizing the private sector for such measures remains problematic, as it does for those measures where carbon abatement carries a financial cost. The role of the MDBs is important in opening new markets by addressing barriers to entry and demonstrating technologies and practices, as well as overcoming private sector perceptions of risk, the transaction costs of smaller projects, and behavioral inertia and low prioritization of such investments. The EBRD, the IFC, and the private sector windows of the other MDBs are therefore strengthening their ability to take on these challenges in the following ways:

- Leveraging their clients' own internally generated cash as a complement to MDB finance.
- Syndicating their loans to commercial providers of finance. Such syndication introduces the market to new risks and types of lending.
- Increasingly cofinancing with financial intermediaries, which allows the aggregation of small EE projects and builds capacity in financial intermediaries who also put their own capital at risk in supporting projects.
- Helping their clients to draw on possible sources of carbon finance.
- Investing in entities—for example, utilities, ESCOs, private companies—in such a way as to strengthen them while demonstrating the benefits of sustainable energy investments. The MDBs thus help to create a demand, both in these entities and in others that emulate them, for future financing from commercial sources. Simultaneously, such projects demonstrate to commercial providers of finance that these investments deliver returns at acceptable risk.

- Looking at sectors with substantial GHG reduction opportunities, but that have not been significant MDB areas of focus in the past. For example, the IFC is developing a pilot initiative, starting in China, to explore opportunities for investments in subsectors with significant GHG reduction potential.

Mobilizing Additional Concessional Resources to Fund the MDBs' Climate Change Agenda

While the MDBs have made good progress in implementing their climate change agenda, the current scale of financial support is not at the levels required to address the challenges that lie ahead. IEA's projection of energy investment needs of $22 trillion (in 2006 dollars) from 2006 to 2030 in their Reference Scenario split roughly 50-50 between developing countries and OECD plus transition economies. Roughly half of total investments are expected to take place in the power subsector, with oil and gas sharing most of the remainder. At roughly $260 billion per year for developing countries' power sectors, the needs are considerably greater than for the past decade. Studies that took place earlier in the CEIF process indicated that financing for about half the total needs were readily identifiable with the gap financing narrowing to about 40 percent in the past few years because of accelerated investments in China. Recent data indicates a further increase in equipment prices, possibly exacerbating the financing problem.

Drawing on the IPCC's models, the World Bank estimated in 2006 that the incremental cost to enable power investments in developing countries to reach a low carbon threshold was of the order of $30–40 billion per year. Global incremental costs for a low-carbon trajectory, including all sectors, are estimated to be $100–500 billion per year. These incremental costs of low-carbon investments compare to the CDM market, which was about $7 billion in 2007, and GEF financing of about $300 million per year. Over the long term, this gap may be filled by combination of a growing market for carbon trading and policy instruments, such as carbon taxes following a post-Kyoto global agreement. However, in the interim, concessional financing is critical to catalyze increased flow of commercial capital and to support early action by the developing countries to address the challenges of climate change.

The GEF has provided incentives to promote a shift in lower-carbon technologies through up-front grant financing. Its mandate in the area of climate change provides financing (a) to pilot and demonstrate innovative technologies; (b) to remove barriers to transform markets, particularly for RE and EE; and (c) for capacity building, in particular the creation of an enabling environment, including establishment of codes, norms, and standards. However, there is a need to take the important lessons learned from pilot and prototype projects and programs and capacity-building efforts, such as those supported by the GEF, to broader programs that help reduce poverty, foster growth, and increase energy access using new low-carbon approaches to development.

With respect to climate adaptation, demands for additional funding are expected to increase sharply across the developing countries especially as the capacity of governments to predict impact scenarios with higher confidence is strengthened. Such funding will be needed in several sectors, and will put pressure on the MDBs' existing trust funds and financing partnerships, for example, those for investments in water services to cities and agricultural areas, and for river basin management and disaster-risk reduction.

The Proposed Climate Investment Funds

Within this context, and recognizing that climate change is central to the sustainable development and poverty reduction agenda, the MDBs, in consultation with developed and developing countries, other development partners, and stakeholders, are seeking to establish the strategic Climate Investment Funds to mobilize new and additional financing for activities and investments that demonstrate how financial and other incentives can be scaled up to support adaptation and mitigation in a coherent and integrated manner. Recognizing that UNFCCC

deliberations on the future of the climate change regime include discussions on a future financial architecture and funding strategy for climate change, the Climate Investment Funds will be an interim measure designed for the MDBs to assist in filling immediate financing gaps and building the necessary knowledge base in the development community. The funds, therefore, will include specific sunset clauses linked to the agreement on the future of the climate change regime.

In developing the Climate Investment Funds, the following principles have been taken into account:

- The core mission of the multilateral development banks is sustainable economic growth and poverty reduction. Climate change mitigation and adaptation considerations need to be integrated into the sustainable development process.
- Multilateral development banks can and should play a role in ensuring access of developing countries to adequate financial resources and appropriate technology for climate actions.
- The multilateral development banks should mobilize new and additional financing for adaptation and mitigation programs to address climate change that are country-led and integrated into country-owned development strategies, consistent with the Paris Declaration focus on country ownership.
- The United Nations is the appropriate body for broad policy setting on climate change, and the multilateral development banks should not preempt the results of climate change negotiations. Actions to address climate change should be guided by the principles of the UNFCCC. The multilateral development banks should assist developing countries in building country-level knowledge, capacity, and development project experience with the feasibility and implications of addressing climate change.

It is proposed that the Climate Investment Funds include a CTF and an SCF.

The Clean Technology Fund

The CTF would promote scaled-up deployment, diffusion, and transfer of clean technologies by funding low-carbon programs and projects that are embedded in national plans and strategies to accelerate their implementation, and that have significant potential for long-term GHG emissions savings. The CTF will do so by supporting policies, measures, and programs that reduce the costs and risks imposed on developing countries by the adoption of low GHG-emitting technologies.

The CTF would fill a specific financing gap in providing finance at more concessional rates than standard MDB terms and at the scale necessary to help provide them incentives to integrate low-carbon strategies into their development plans and investment decisions. The CTF thus responds to the Development Committee's mandate of September 2006, which called for "for deeper cooperation between the World Bank, regional development banks, and other development partners in their engagement with middle-income countries, and encouraged the World Bank to develop a menu of options to respond to country demand-driven initiatives for targeted blending of concessional donor support with multilateral development bank loans in cases of market failure or where there are affordability issues."

A key feature of the CTF would be its ability to blend financing to tailor terms to a target level of concessionality, which would vary depending on project-specific factors. As noted in the Development Committee paper, "Strengthening the World Bank's Engagement with IBRD Countries" (2006), in many middle-income countries, while multilateral development banks would be ready to provide additional lending for projects and programs related to the Millennium Development Goals and global public goods (such as climate change mitigation activities), governments are reluctant to borrow on nonconcessional terms for projects and programs that generate little additional revenue. Concessional forms of finance could help unlock demand for the financing of such projects and programs. Blending CTF resources and multilateral development bank loans could augment the volume of financing available and tailor concessionality to needs better, with the degree of concessionality calibrated to achieve transformative investments that would otherwise not proceed.

The CTF would provide positive incentives tailored to cover the identifiable additional costs of low-carbon investments necessary to make a project viable. In order to maximize impact, the CTF will work with the private sector, as well as the public sector, to bring sufficient technological know-how and capital to dramatically scale up clean technology deployment, while

remaining technology neutral. The CTF will utilize a range of concessional financing instruments, such as grants and concessional loans, and risk mitigation instruments, such as guarantees.

Country access will be based on (a) ODA eligibility (according to OECD/DAC guidelines); and (b) an active MDB country program. Financing from the CTF could cover, among other low-carbon technologies, one or more of the following proposed transformational investments:[6]

a. Power sector:
   i. Increase substantially the share of RE (including solar, wind, hydropower, biomass and biofuels, geothermal, and waste-to-energy), in the total electricity supply.
   ii. Switch to highly efficient gas plants resulting in reduced carbon intensity of power generation.
   iii. Achieve significant GHG reductions by adopting best available coal technologies with substantial improvements in EE and readiness for implementation of CCS.
   iv. Promote grid interconnection schemes that support lower-carbon energy production and/or significant transmission efficiency improvements.
   v. Large reductions in transmission and distribution losses (new transmission and distribution systems using energy-efficient technologies, or retrofits/upgrades).
   vi. Adopt utility managed demand management programs for retail and wholesale customers.

b. Transportation:
   i. Make a modal shift to public transportation in major metropolitan areas, with a substantial change in the number of passenger trips by public transport.
   ii. Improve fuel economy standards and fuel switching.

c. EE in buildings, industry, and agriculture:
   i. Large-scale adoption of energy efficient technologies that lowers energy consumption per unit of output in the following areas:
      - Building design, insulation, lighting and appliances.
      - District heating.
      - Energy-intensive industries and equipment (motors and boilers).

The starting point in developing operations to be cofinanced by the CTF would be a request from a country for a programming mission to be undertaken by the relevant MDBs to begin a dialogue on how the CTF may contribute to scaled-up, low-carbon activities. It is envisaged that the government will play a central role in programming the CTF's public sector–related projects and in donor coordination. The investment plan would take into account the framework of the MDBs' Country Assistance/Partnership Strategies, other relevant national planning exercises, and activities of other international programs, including the GEF. A key feature of the programming missions would be engagement at the country level with the United Nations and bilateral development and investment agencies, particularly with a view to mobilizing cofinancing and ensuring harmonized policy support. Investment plans, and the proposed pipeline of projects and programs, will be assessed and prioritized on the basis of the following four sets of criteria:

a. Potential for long-term GHG emissions savings:
   i. Cumulative emission reductions, or emissions avoided, from the investment and per-unit cost.
   ii. Reductions in carbon intensity.
   iii. Scalability and replicability of low-carbon investments, given carbon intensity of GDP and electricity generation, economic growth rates, and sector expansion plans.
   iv. Significant opportunity for reducing growth in GHG emissions.

b. Demonstration potential—accelerate deployment, diffusion, and transfer of low-carbon technologies, consistent with the objectives of the CTF, at the following scale:
   i. Thematic programs and large-scale projects.
   ii. Sector or subsector in a given country.
   iii. Subnationally, by focusing activity on a particular province, state, or municipality.
   iv. Regionally, particularly where regional cooperation is required.

6 The Fund would not support technologies that are still in the research and development stage, but should be focused on deployment that may include demonstration of new low-carbon technologies.

v. Through the private sector or PPPs.

c. Development impact:

i. Poverty alleviation, fuel savings, efficiency gains, air and water quality, energy security and access, economies of scale, economywide impact, local industrial development potential, and environmental co-benefits.

d. Implementation potential:

i. Technology development or commercialization status, and the presence or the possibility of developing in the short term policies and capacity to support technology adoption.

ii. Minimum level of macroeconomic stability and stable budget management.

iii. Commitment to an enabling policy and regulatory environment, including planning commitment and expenditure framework in the sector or subsector.

iv. Incentives for leveraging private sector financing.

v. Institutional arrangements for implementation of policies.

Investment plans will be submitted to the Trust Fund Committee to endorse further development of activities for Trust Fund cofinancing and to facilitate prioritization of the pipeline of projects. Subsequently, a proposed program or project, developed pursuant to the investment plan, will be submitted by the relevant MDBs, prior to its appraisal, to the Trust Fund Committee for approval of trust fund financing. The further processing of a program or project will follow the MDBs' polices and procedures for appraisal, as well as MDB board approval and supervision.

A key feature of the governance structure of the CTF is the proposed establishment of an MDB Committee to facilitate collaboration, coordination, and information exchange. The MDB Committee will, among other things:

a. Identify specific areas of MDB cooperation to harmonize their climate change programs and actions, linking their initiatives with Climate Investment Trust Funds programs and projects.

b. Monitor progress in implementing programs and report to the Trust Fund Committee on compliance with approved criteria and priorities on the use of trust fund resources.

c. Review a draft annual consolidated report on the Climate Investment Trust Funds activities, performance, and lessons, including details of the fund's portfolio, status of implementation, funding allocations for the previous period, pipeline of projects and funding projections, administrative costs incurred, and other pertinent information.

d. Serve as a forum to ensure effective operational coordination, exchange of information, and experience among the MDBs.

e Liaise with other development partners, including bilateral development agencies and banks, for purposes of promoting cofinancing of activities through an annual consultation between the MDBs and development partners, including bilateral development banks.

The Strategic Climate Fund

The proposed **SCF** would finance targeted programs designed to pilot new development approaches or scale up activities aimed at a specific climate change challenge. The SCF will remain flexible and open to the establishment of new programs as new challenges are identified and circumstances change. Resources will be mobilized and pledged to specific programs within the SCF. Arrangements to guide the program, ensure effective partnerships, and provide accountability would be defined for each program to ensure the effective operations of the program.

A Pilot Program for Climate Resilience will be the initial program of the SCF. The aim of the Pilot Program for Climate Resilience (PPCR) is to support rapid learning-by-doing on an integrated approach to climate resilience and programmatic lending, in order to provide lessons that will feed into the operation of a successful Adaptation Fund under the Kyoto Protocol. The PPCR will move quickly to provide about 5–10 countries with scaled-up support for integrating climate resilience into their development planning and financing.

Two types of activities will be supported during the next three to five years in recipient countries:

- Technical assistance to enable developing countries to build on existing national work, including the national communications and National Adaptation Plans of Action, to integrate climate resilience into core development plans and budgets. Approximately $1–2 million dollars will be allocated to each pilot country for this phase.

- Finance for investments identified in the climate resilient development plans. In this phase, there will be an emphasis on budget support approaches, where possible, and blending with national financing and existing international support mechanisms.

The EIB is also in the process of expanding its product range to enhance its role in the finance of clean energy investments. To complement the three funds highlighted above, EIB has established a Post-2012 Carbon Fund. The purpose of this Fund is to contribute to EU climate change mitigation policies through the promotion of confidence in the emergence of a post-2012 carbon credit market, as well as support mitigation projects through monetization of their post-2012 emission reduction flows. In March 2008, the fund closed with commitments of €125 million.

The EIB is also promoting activities related to biological carbon sequestration. A European Ecosystems (Biodiversity) Investment Fund is being considered, which would serve as a pioneering initiative to develop, test, and demonstrate the use of proven financial frameworks—in this case, an equity fund—for biodiversity conservation. The fund would include private sector investment, and it would aim to enhance its commercial success by the successful application of biodiversity credits comparable to those already implemented in connection with climate change related instruments, such as carbon credits. In addition, a proposed Timberland Private Equity Investment Fund would target investment opportunities involving the creation of new timber assets meeting EIB social and environmental criteria and including biodiversity improvement, climate change mitigation and the utilization of carbon credits. The fund is currently in advanced design stage.

The EIB and the European Investment Fund (EIF) are actively involved in the implementation of the EU Global Energy Efficiency and Renewable Energy Fund (GEEREF), which was officially presented to the public in December 2007 on the occasion of the UNFCCC conference in Bali. GEEREF is a fund of funds aimed at investing in regional risk capital funds catalyzing private investment in EE and RE projects in developing countries and economies in transition. Finally, the EIB has issued a Climate Awareness Bond combining innovative features focused on climate protection with unique investment opportunities. Named EPOS II (European Public Offering of Securities), the bond provides for the earmarking of funds raised to be invested in EIB lending projects in the fields of RE and EE (including wind, hydro, solar and geothermal production and district heating, cogeneration, building insulation, energy loss reduction in transmission and distribution).

Working Together: Strengthening the Partnership

It is evident from the foregoing that the MDBs share a common vision concerning approaches and actions to tackle the challenge posed by climate change. Prior to Gleneagles, they had a long history of close cooperation in such areas as EE, RE, clean coal technologies, urban transport, forestation, and environmental protection. Cooperation included cofinancing of key projects, as well as joint or closely coordinated country policy advisory work designed to improve the overall efficiency of the energy sector and to encourage the development of appropriate regulatory regimes. However, while all these activities had important implications for climate change, an overall cooperative framework for their climate change activities was absent.

In the post-Gleneagles period a coherent and focused collective MDB climate change agenda has emerged. In particular, each MDB has consulted closely with its sister institutions in developing and revising its overall climate change and energy strategies to respond to the new global priorities. The result is a largely consistent set of policies, programs, and instruments across the IFIs. Further initiatives, designed to increase the level of collaboration, are under way; these are considered particularly important, since

the pace of implementation picks up and as new sources of financing for climate change programs, such as the proposed CTF, become available. For example, an MDB workshop on mainstreaming climate change mitigation and adaptation was hosted by the EBRD in June 2007. This working session focused on some of the practical issues faced by MDB staff in scaling up climate activities, and covered such topics as organization, targets, incentives, measurement, and reporting. More recently, an MDB workshop was held in Washington, D.C. at World Bank and Inter-American Development Bank (January 17–18, 2008) to discuss how to move forward with joint efforts to scale up funding for high-impact public and private sector investments to reduce GHG emissions and strengthen climate resilience. In another example, the AfDB and the World Bank have initiated a series of joint consultations with a view to developing a consistent approach to clean energy development and adaptation strategies for Africa; a meeting was held in early May 2008 and several follow-up sessions are planned. The EBRD and EIB cosponsored a workshop on adaptation in April 2008. The paragraphs below highlight some of these cooperative endeavors, as well as the mechanisms through which the needed enhanced cooperation will be achieved.

Scaling Up Joint Sector Work

The sheer scope and complexity of the climate change agenda and the overriding imperative for a coherent and consistent approach on the part of the MDBs require that they further strengthen collaboration with respect to their analytical work and related methodologies. Areas of potential mutual interest include the development of the low-carbon country growth strategies highlighted above, measuring the carbon footprint and carbon impact of MDB-funded projects, the application of shadow pricing for GHG emissions in project analysis, project identification, and preparation and knowledge sharing and dissemination. Some examples are given in the following paragraphs.

Carbon Foot Printing

Recognizing the link between carbon emissions and financing policies and practices, the MDBs have agreed to collaborate in developing a harmonized approach to assessment and reporting of portfolio GHG emissions. Most of these financial institutions are only at the beginning stages of assessing their portfolio emissions, and are still deciding key questions such as what methodology to use, what sectors to cover, and how to aggregate and report what they find. This initiative was started by the IFC and EBRD's approach to reporting the carbon footprint of their projects. The reports are consistent with Scopes 1 and 2 of the GHG Protocol, which is designed to address the exposure of their portfolio to possible changes in treatment of CO_2 emissions. The IFC currently reports the gross CO_2 emissions of projects with annual outputs (direct and indirect from electricity consumption) exceeding 100,000 tons of CO_2 per year.

The World Bank has commissioned a series of studies on methodologies for assessing GHG emissions, which are being carried out in close collaboration with the MDBs. The objective of the exercise is to determine the impacts of MDB-funded projects in an effort to determine the impact of MDB interventions on climate change. The options that are being considered for MDB-funded projects include (a) gross CO_2 impacts; (b) direct, net CO_2 impacts; and (c) direct and indirect net impacts. These options, their impacts on projects and project design, the feasibility of these approaches, and the impact on the cost of project preparation will be analyzed to help determine the best approach. Based on the outcome of the studies highlighted above, it is expected that the MDBs will move toward a standard set of practices with respect to carbon footprint measurement in the near future.

Improved Economic Analysis of Projects—Shadow Pricing Carbon

Now that there is widespread acceptance of global warming and climate change and an economic cost associated with this, it is important to understand the implications of these costs for MDB interventions. The standard in all MDBs is that project economic analysis needs to be sufficiently robust to include all project costs and benefits, including identifiable externalities. While the MDBs are not making investment decisions based on a shadow price for carbon, it is logical is to start developing capacity for and understanding the implications of including GHG emissions as a component of the broad economic analysis. Shadow pricing carbon can also help ensure that the incentives are identified and mobilized for project preparation, selection, and design, which properly takes climate change into account. It should be noted, however, that the economic analysis of MDB projects, particularly supporting public sector

investments in developing countries, should be in line with the prevailing practice worldwide, and until developed countries routinely use the price of carbon in their investment decision making, this should not be expected for similar projects in poorer countries.

EIB has been applying an economic cost of carbon in its ERR calculations for several years; this results in some projects being more attractive in economic terms and others being less, and such an approach has begun to demonstrate its potential value in influencing choice in favor of cleaner technologies.

The IFC has committed to pilot the use of a carbon shadow price in its economic analysis to test what the impact would be on project financial analysis starting in July 2008. The purpose of this pilot will be to provide information on the impact on expected financial returns of including a price for carbon, including the impact on less GHG-intensive alternatives. The analysis will not be used to exclude otherwise profitable and developmentally beneficial investments. There is currently no agreement on the cost to be used, although there are reference points in the literature and in some government practices; most likely the IFC will use a range encompassing different views. The problem is made difficult by the life of CO_2 in the atmosphere (about 100 years) and the uncertainty of its longer-term impacts, the nonlinear nature of impacts, and the "size of the tail" regarding low-probability, high-impact events.

Measuring and Monitoring Performance

All the MDBs and their shareholders have recognized the importance of setting monitorable targets if they are to achieve their climate change agenda. Each MDB has enunciated specific targets. As examples, the EBRD is committed to investing $2.2 billion in EE and renewables in the three-year period following the launch of the initiative in May 2006; the EIB has incorporated its clean energy targets into a rolling three-year plan that aims currently for €800 million annual investment in RE; and the World Bank plans to double RE investments to $2 billion in fiscal 2006–08, compared with the previous three-year period. The World Bank is also committed to assisting its client countries to complete their ongoing and planned work on low-carbon growth strategies.

While the MDBs' enunciated goals will be critical in assessing their collective and individual performance, it is important to emphasize that they are output as opposed to outcome targets and do not measure the carbon impact of the MDBs' programs on the ground. However, once standard practices on carbon impacts are agreed upon and low-carbon growth strategies are completed, the basis for determining clear outcome targets (which can in turn be incorporated into country and regional strategies) may, together with the client countries, be established. At that point, the MDBs plan to explore the feasibility of establishing and committing to such outcome goals. However, in this connection, it is important to emphasize that MDB-funded projects are client driven; as such, these institutions have limited direct control over their lending and investment programs. As an alternative, the MDBs may consider establishing guidelines for project analysis in which all projects could include an explicit consideration of GHG emissions in the economic analysis of projects, as with the carbon pricing approach described above, thus providing an appropriate incentive for project selection and preparation.

Low-Carbon Projects: Joint Work on Identification and Preparation

The sustainable development strategies that emerge from the country driven work described above, are expected to include marginal carbon abatement curves in which low-carbon projects, their costs, and expected impacts are specifically identified and prioritized. The identified projects that make up these marginal carbon abatement curves would then need to be prepared by a sponsor. For those projects that have a large global public good component, concessional financing for project preparation may need to be mobilized, since the public good component of the project may make them riskier and, thus, a lower priority for project developers. It is important that the MDBs work together to catalyze this process. For many projects, it is expected that client countries would approach the MDB that has a comparative advantage in local knowledge, technology or sector expertise or speed in delivery, for example, EE for the EBRD, the EIB for CCS, the IFC for renewables, and the ADB for transport. However, for selected larger, more complex projects, the MDBs expect to work together jointly, since resource needs—both capital and human—could be considerable.

Knowledge Sharing and Dissemination

As the MDBs progressively broaden and deepen their climate change activities, it is important that the lessons of experience are promptly shared across the institutions and more importantly with the clients themselves. For example, key countries in Asia and Latin America could profit significantly from the knowledge gained by the EBRD in implementing its EE programs; it is also now critical that the World Bank share the experience it has gained from its LCGS work in the high-impact countries. Furthermore, given the hitherto limited MDB interventions in the transport sector, it is vital that they collectively learn from recent ADB initiatives in this sector. Similarly, IDB will gain valuable insights from its work on biofuels, and the AfDB will go through a significant leaning curve as it ratchets up its adaptation programs. It will be equally vital that EIB shares its experiences from its planned CCS projects, particularly with China and India.

The MDBs have therefore committed themselves to establishing more systematic knowledge exchange mechanisms. As part of this overall effort, the MDBs have agreed to pilot the establishment of climate change thematic groups across the banks. Such groups would be organized by topic and would include all staff, working on these issues across the MDBs. The experience in other organizations is that such virtual groups, which at their minimum are little more than a consolidated e-mail list, can be extremely cost-effective mechanisms to transfer subsector knowledge on a just-in-time and demand-led basis. As part of this pilot the EBRD has agreed to take the lead on EE, the ADB on transport, the IDB on biofuels, the EIB on CCS, the AfDB on adaptation, and the World Bank on renewables and clean coal.

As the MDBs' climate change activities expand, it has also been increasingly important that each knows what the others are doing at the operational level, both to leverage their individual efforts and to help identify key gaps. In this connection, the MDBs have established a common data base on their activities. This site, which the MDBs are committed to updating regularly, is accessible at www.worldbank.org/environment/ccandmdb.

Improved Governance Mechanisms

The heads of the environment departments of the MDBs meet twice a year at the Multilateral Financial Institutions-Working Group on the Environment (MFI-WGE) to exchange information on their respective programs, agree on mutual priorities, and so forth. This forum has helped to foster cooperation on climate change policies and practices. For example, it was instrumental in promoting the joint work on foot printing discussed above. However, the MDB staff who participate in this group do not have direct responsibility for developing operations within their respective institutions. Given that the climate change agenda has major implications for virtually the entire range of activities of the MDBs, this representational gap undermines the effectiveness of the MFI-WGE as coordinating body for operational work.

The work of the MDBs in the context of the proposed Climate Investment Funds provides the suitable occasion to improve these collaborative mechanisms. Specifically, the MDB committee, which will be established as a part of the governance framework for the CTF, will complement the activities of the MFI-WGE. This committee, which will meet quarterly, and be composed of members with direct operational responsibility for climate change agenda of their respective institutions, will, among other things, have direct responsibility for operational collaboration across the institutions.